HEALTH AND SAFETY PLAN
FOR ENDICOTT WELLFIELD SITE
VILLAGE OF ENDICOTT
ENDICOTT, BROOME COUNTY, NEW YORK

Prepared for:
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

Prepared by:
TAMS Consultants, Inc.
The TAMS Building
655 Third Avenue
New York, New York 10017

April 1986

TAMS CONSULTANTS, Inc.
300 BROADACRES DRIVE, BLOOMFIELD, NEW JERSEY 07003 (201) 338-6680

April 9, 1986

Mr. Jeff Brandow
Project Manager
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, N.Y. 12233

Dear Mr. Brandow:

Re: Endicott Wellfield Project
Contract No. D001275

Enclosed are seven (7) copies of the HEALTH AND SAFETY PLAN for the referenced project.

As per our discussions at the site on March 20, 1986, I have initiated the aerial photography and ground control targeting work without approval of this PLAN. None of this work, however, will occur on the EnJoie Golf Course.

I will contact you during the week of April 14th, concerning approval for an early geophysical start-up date.

The QA/Work Plan (long and short) are being sent under separate cover.

Very truly yours,

TAMS CONSULTANTS, Inc.

Albert DiBernardo

AD/ju
Enc.

ENDICOTT WELLFIELD HEALTH AND SAFETY PLAN

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HEALTH AND SAFETY PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY ENDICOTT WELLFIELD SITE VILLAGE OF ENDICOTT BROOME COUNTY, NEW YORK

1. INTRODUCTION

1.1 Authorization

The New York State Department of Environmental Conservation, Division of Solid and Hazardous Waste (NYSDEC), Albany, New York has retained TAMS CONSULTANTS, Inc. (TAMS), 655 Third Avenue, New York, N.Y. to investigate the nature and extent of contamination at the Endicott Wellfield Site, and to perform necessary engineering studies to identify, evaluate and select a cost-effective, environmentally sound, long-term remedial action. This work is being performed under the conditions presented in the AGREEMENT dated January 3, 1986 between NYSDEC and TAMS. Notice to proceed on the work stated in the AGREEMENT was provided in a letter dated 11 March 1986 by Mr. Norman Nosenchuck, P.E., Director, Division of Solid and Hazardous Waste, of NYSDEC.

1.2 Background

The Village of Endicott, Broome County, New York (VOE) currently operates four wells which provide water for approximately 45,000 people. The well of interest, the Ranney Collector Well, supplies approximately 50 percent of water for the VOE. The well is located along the north bank of the Susquehana River at the southeast corner of the EnJoie Golf Course. Figure 1 provides a site location map. Figure 2 provides locations of present wells and former test borings.

The Ranney Collector Well has been in continuous use since 1950 at production levels ranging up to 7000 gallons per minute (gpm). In May, 1981, samples collected from the well showed the presence of vinyl chloride (8.4 ppb) and trace levels of other organics. The levels of contamination were further confirmed in 1982 resulting in the complete closure of four laterals within the well and the installation of air stripping equipment in the well.

In April, 1983, the NYSDEC Division of Water initiated an incident response study to identify the extent of contamination, determine possible sources and develop a remedial action to mitigate the effects of the contamination on the water supply. The results of the study indicated that a cost-effective method to immediately lessen the contamination at the well would be to install an interceptor (purge) well.

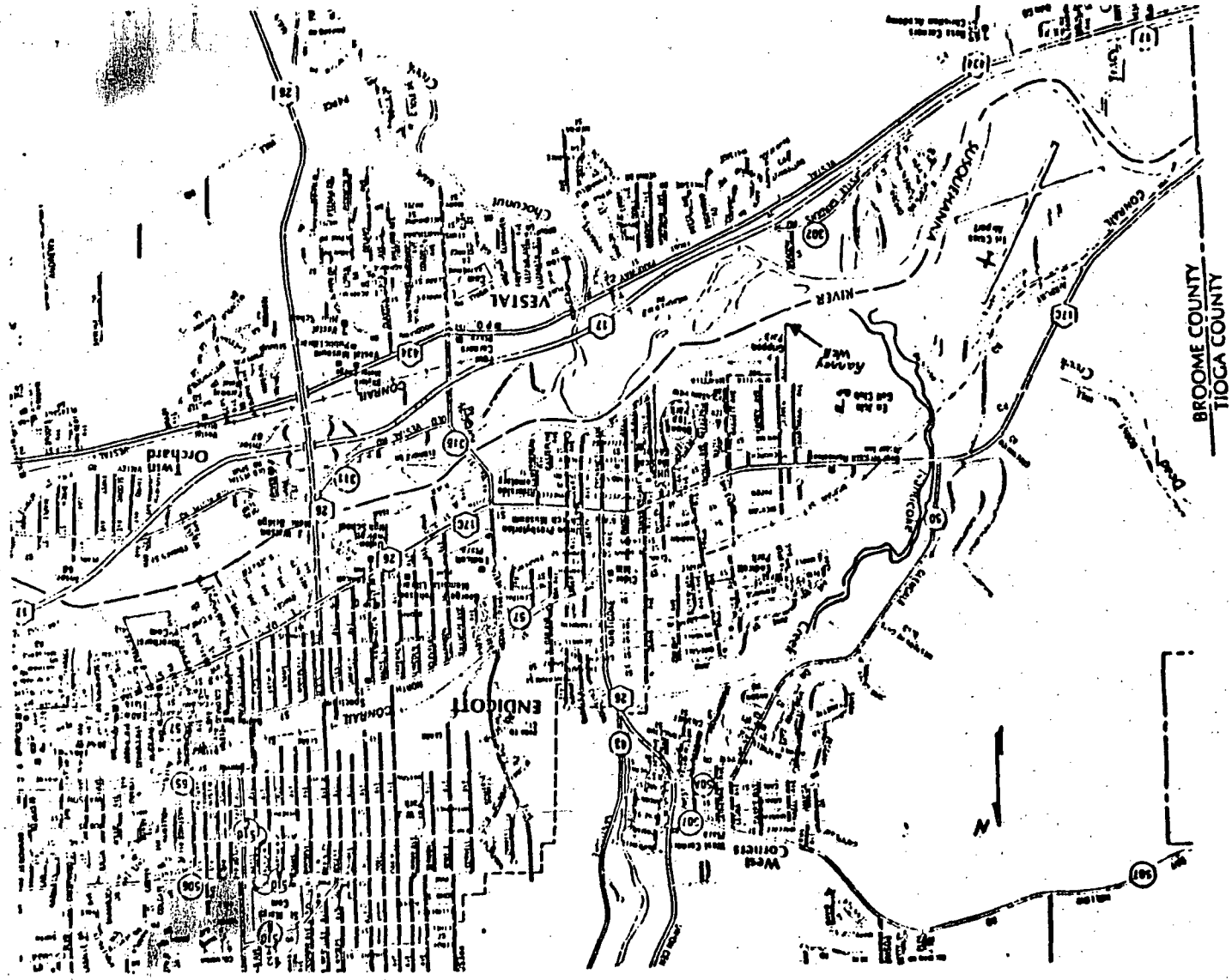

Figure 1 - Ranney Well, Village of Endicott, N.Y.
Site Location Map

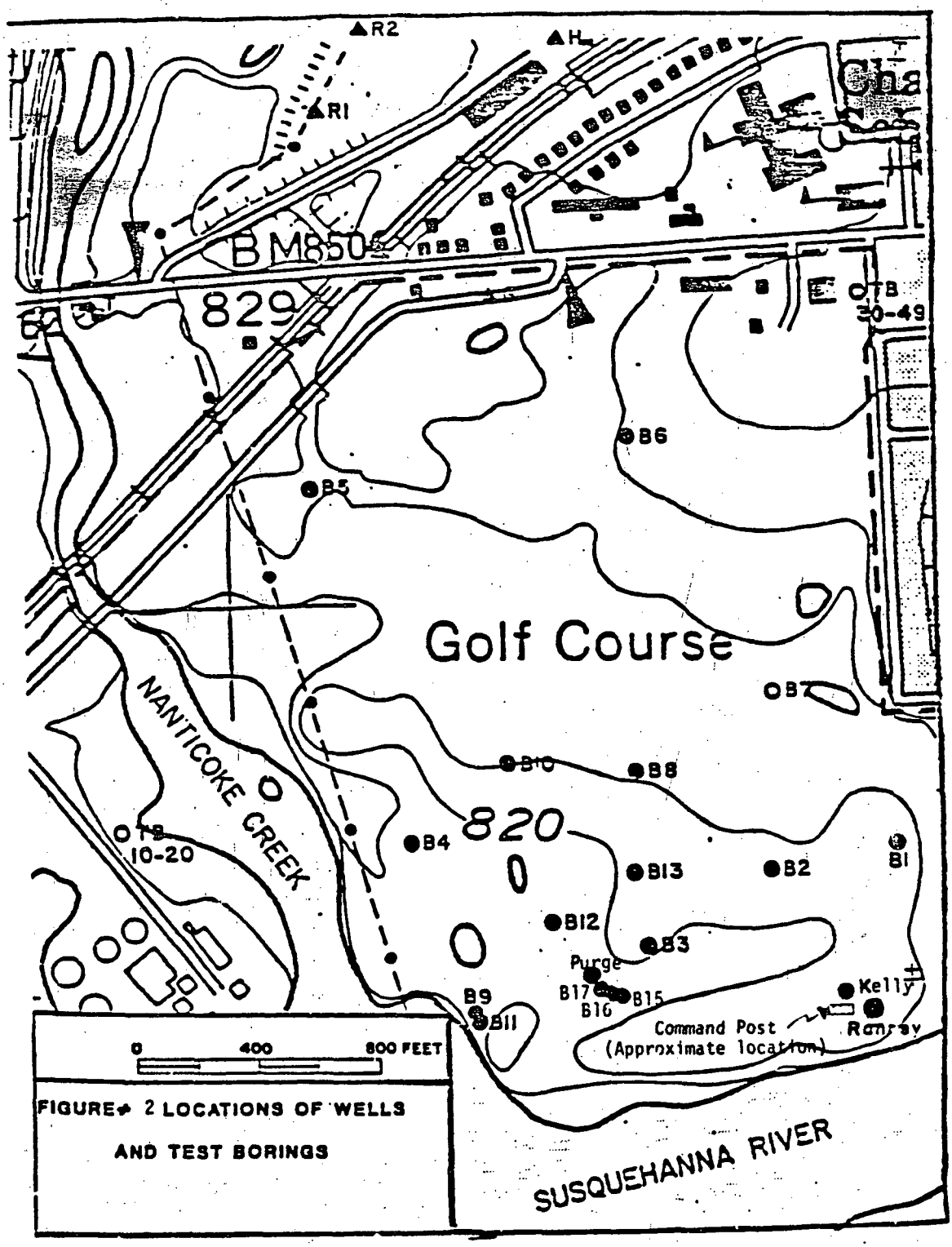

FIGURE 2 LOCATIONS OF WELLS AND TEST BORINGS

The chemical analysis data which has been collected for the NYSDEC study and the Village of Endicott are presented in tabular form in Appendix D.

1.3 Purpose

The purpose of this Health and Safety Plan is to inform site investigation personnel of the known hazards associated with completing work at the En-Joie golf course. Subcontractor personnel are required to become familiar with and follow the provisions of this plan as well as applicable Federal, State, and local laws, including those set forth by OSHA and NIOSH.

2. HAZARD EVALUATION

2.1 General

Hazards associated with field work fall into two categories. These are physical hazards, such as broken bones and heat stress, and chemical hazards. The Endicott Wellfield has limited potential for both types of hazards.

2.2 Physical Hazards

Field work will be conducted on public properties (golf course, waste water treatment facility) where physical hazards are assumed to be minimal. There is, however, the possibility of injury from falling while working in wooded or uneven terrain, and from being struck by golf balls. No problems associated with heat stress are anticipated, unless working for extended periods in impervious clothing when the ambient temperature is greater than 70°F. Heat stress monitoring is discussed further in Appendix A (pp. A-21 to A-23).

There are also specific hazards associated with the various field activities (e.g. drilling, seismic studies, etc.) discussed in Section 3.1. These activities shall be conducted in conformance with applicable OSHA regulations.

2.3 Chemical Hazards

2.3.1 The degree of chemical hazard is a function of the nature of the chemical, the amount (or concentration) of the chemical, and the potential routes of exposure, and duration of exposure. There are a wide range of physiological responses which may occur following exposure to toxic chemicals. These responses are characterized as either acute (developing shortly after exposure) or chronic (occuring only after extended or repeated exposures, or considerably after a single exposure). It is important that safety precautions guard against both types of hazard. Frequently, a level of protection which seems excessive for protecting against an acute reaction is designed to prevent a chronic response.

Nature and Concentration: Volatile halogenated compounds detected in wells at Endicott (by EPA method 601) are vinyl

chloride (chloroethene); trichloroetheylene; 1,1-dichloroethane; 1,2-dichloroethane; 1,1,1-trichloroethane; chloroform; 1,2-dichloroethylene (cis and trans isomers); methylene chloride; bromodichloromethane; dibromochloromethane; and chloroethane.

The maximum total concentration of volatile halogenated organics found in any well was 2284 ppb (well B-12 on October 1, 1985). Recent purge well concentrations (pumping at 600 gpm) of total volatile halogenated organics average about 125 ppb (including 35 ppb vinyl chloride).

Recent analyses of the Ranney Well (November 1985 through January 1986) generally showed less than 10 ppb total volatile halogenated organics. Analysis for metals revealed no priority pollutant metals above one ppm. There is no record of full priority pollutant analysis for any well samples. A more complete listing of available chemical data is provided in Appendix D.

2.3.2 Potential Routes of Exposure

These are generally considered to consist of:

- o inhalation
- o ingestion
- o skin (dermal)
- o eyes

Inhalation: In general, inhalation is not a major concern for the following reasons:

- o There are no reported airborne contaminants
- o The area is in use by the public without any reports of adverse affects
- o Reported levels of water contamination are generally low, so the potential for air contamination is also low.

Since the contaminants reported are volatile, there remains the possibility of localized higher contaminant concentrations being present during drilling and sampling of monitoring wells and in the immediate vicinity of the air stripping exhaust. "Worst-case" calculations (using Henry's Law) indicate a theoretical possibility of localized atmospheric vinyl chloride concentrations in excess of the one ppm TLV (5 ppm/15 minute STEL) established by OSHA.

Ingestion: Hazardous waste may be transferred from the hand to the mouth when eating, drinking, or smoking. For this reason, these activities are prohibited during field work and proper hygiene is required.

Skin: The degree hazard at Endicott due to skin contact is considered to be very low, since the reported levels of contamination are very low.

Eyes: Many chemicals have the potential to injure the eyes to some degree through surface contact or absorption. At Endicott, there is a small possibility of eye injury from both aqueous (e.g. by splashing during sampling) and airborne (vapor) contamination.

3. SAFETY PROCEDURES

3.1 Safety and Orientation Meetings

The Site Safety Officer shall conduct daily safety meetings each morning with on-site employees. These meetings shall inform employees of the day's activities and individual responsibilities, inherent hazards, any changes in levels of protection, and approved changes to the Health and Safety Plan. Opportunity shall be provided for employees to voice safety-related concerns.

3.2 Field Work

The drilling program will have the most impact on the risk of exposure for all on-site personnel. During active drilling periods, the chance of employee exposure by inhalation will be highest, particularly around boreholes and testpits. Therefore personnel performing drilling operations and inspection will be required to wear Level D protective equipment; and upgrade protective equipment if organic ambient concentrations monitored on-site exceed 1 ppm above background (as measured with photoionization detector). Respiratory protection will be required as specified in Section 3.3.2.

Personnel onsite will be engaged in different work tasks. These work tasks include:

- o drilling, soil sampling, and well installation
- o sample preparation for shipment
- o geophysical investigations
- o water and soil quality sampling
- o ground-control surveying
- o field surveying
- o site inspection and monitoring
- o administration and recordkeeping

3.3 Personnel Protection

Personnel protection will be selected based on the hazards present at the site and the types of work to be performed.

3.3.1 Physical Hazard Protection: To protect against the possibility of head injury, field personnel will stay off the fairways and greens whenever possible. In addition, hardhats are also specified for field personnel.

Since there may be walking through wooded or uneven terrain, as well as work in the vicinity of machinery, steel toe and shank boots will be required.

Personnel and equipment involved in drilling operations and seismic geophysical surveys using blasting shall also be governed by applicable OSHA regulations.

3.3.2 Chemical Hazard Protection: Although the reported levels of contaminations are low, precautions must still be taken to ensure adequate protection of all personnel.

a. Protective clothing: Although the potential hazard associated with skin and eye contact at Endicott is low, prudence dictates that reasonable precautions be taken. For personnel involved in sampling contaminated wells or drilling, rubber gloves, rubber rainsuit or disposable coveralls, boots, goggles or safety glasses with side shields and hardhats are a minimum.

b. Respiratory protection: The specific level of respiratory protection will be determined by on-site air monitoring (see Section 3.4 below). It is anticipated that all work with the exception of drilling, sampling contaminated wells, and work near air stripper exhaust, will not require respiratory protection. The need for respiratory protection will be determined by the following criteria:

   - Air monitoring indicates breathing zone concentrations less than one ppm above background: No respiratory protection required.

   - Breathing zone concentrations greater than or equal to one ppm above background, but less than five ppm above background: Air purifying respirator (APR) with organic vapor cartridge canister.

   - Breathing zone concentrations greater than five ppm above background: Self-contained breathing apparatus (SCBA), or withdraw from area until concentration is less than five ppm above background. If other instrumentation (e.g. Draeger tube or portable gas chromatograph) demonstrates that vinyl chloride is present at or below allowable OSHA limits, then work may continue with APR's up to a maximum total organic vapor concentration of 50 ppm (as indicated by the AID-580).

   Initial screening and monitoring will be conducted in Level C respiratory protection.

3.4 Monitoring

Background readings shall be obtained at least twice daily outdoors upwind of scheduled work locations for that day and prior to the commencement of all sampling and drilling activities. Readings shall be taken at outdoor locations approximately 20 feet upwind and downwind of site operations. Frequent or continuous breathing zone air monitoring will be conducted during all sampling and drilling activities. Monitoring frequency may be reduced at the discretion of the site safety officer, if there is no reason to believe that elevated levels of organic contaminants will exist (e.g. during auger withdrawal).

The monitoring instrument to be used is the AID-580 Portable Organic Vapor Monitor equipped with a 10.0eV lamp. It shall be calibrated daily. The alkyl halides (chloroethane, chloroform, etc.) are not detected by the 10.0eV lamp. Draeger tubes will be used to verify the presence or absence of vinyl chloride.

3.5 Disposal and Decontamination

Since a low hazard level is anticipated, materials derived from field activities (e.g. soil from drilling, water from bailing or well development) will remain on site. Well water from pumping tests will be disposed in the En-Joie golf course pond.

Protective clothing may be reused if clean and intact. Disposable protective clothing will be discarded daily. Organic vapor cartridges will be disposed daily, if used. All garbage will be bagged and disposed as ordinary trash.

3.6 Safety, Hygiene, and First Aid

Personnel shall wash hands prior to eating, smoking, drinking, or leaving the site. Bathing is strongly encouraged after daily on-site work activities are completed. Work shall be performed in accordance with applicable OSHA regulations. In addition, all work (including work by subcontractors) shall be in conformance with applicable sections of TAMS Health and Safety Manual (Appendix A).

TAMS/GZA will provide a site Safety Officer to monitor the implementation of this Health and Safety Plan. Standard first aid procedures are included in Appendix C. A field trailer/command post will be provided within the fenced area near Ranney Well (see figure 2). This trailer will be equipped with a fully stocked industrial first aid kit, eyewash station, SCBA, and a fire extinguisher.

Subcontractors will be responsible for providing their own personnel with all necessary protective clothing and equipment.

Although all subcontractor employees are required to follow the guidelines set forth herein, the safety of all site personnel is ultimately the responsibility of their respective employer. All subcontractors will be informed of the anticipated hazards on-site (based on currently available data), oriented with the health and safety procedures, and provided with a copy of this document. However, NYSDEC or TAMS/GZA cannot be responsible for enforcing the Health and Safety Plan.

3.7 Site Safety Plan

The TAMS Site Safety Plan for the proposed field work for the Endicott Wellfield project is presented on pages 10 through 15.

3.6 Endicott Wellfield Site Safety Plan

TAMS CONSULTANTS, INC.
SITE SAFETY PLAN

A. GENERAL INFORMATION

Site: Endicott Wellfield Site Project No.: 5004
Ranney Well
Location: Endicott, New York Contact: Jeffrey Brandow, NYSDEC
Albert DiBernardo
Prepared by: Allen Burton Date: March 24, 1986

Approved by: Patrick Sorensen Date: March 25, 1986

Objectives: Remedial Investigation to determine nature, extent and cause of contamination including installation of monitoring wells, geophysical studies and performance of a pumping test.

Proposed Date(s) of Site Work: May 15 to August 1, 1986

Background Review: Complete Preliminary: _____

Overall Hazard: Serious: _____ Moderate: _____
Low: X Unknown: _____

B. SITE/WASTE CHARACTERISTICS

Waste Type(s): Liquid X Solid _____ Sludge _____ Gas X

Characteristic(s): Corrosive _____ Ignitable _____ Radioactive _____
Volatile X Toxic X Reactive _____ Unknown _____ Other _____

Facility Description: Ranney Well consists of a 13-foot diameter caisson, approximately 110 ft deep, containing 4 tiers of laterals which extend radially from the well. Well constructed in 1940's and supplies approximately 50 percent of the water for the Village of Endicott.

Principal Disposal Method (type and location): _____

Not applicable

Unusual Features (dike integrity, power lines, terrain, etc.): Flooding of Susquehanna River occurs at the site during early spring; golfing occurs from early spring.

Status: (active, inactive, unknown): Golf course active

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SITE SAFETY PLAN

History: (Worker or non-worker injury; complaints from public; previous agency action): No reports of injury or illness. Ranney Well has exceeded allowable levels of vinyl chloride.

Hazardous/Toxic Material (known or suspected, contaminated media or in storage container, etc.): Vinyl Chloride detected in water (1-8 ppb range) at the Ranney Well. Other volatile chlorinated organics detected in monitoring wells at up to 1000 ppb. (see Appendix D)

Hazard Assessment (toxic and pharmacologic effects, reactivity, stability flammability, and operational concerns, sampling, decontaminating, etc.

Vinyl Chloride: TLV = 1 ppm in air (OSHA) 5ppm short term (15 min)

C. SITE SAFETY WORK PLAN

Perimeter Establishment: Map/Sketch attached yes Site secured? N/A

Perimeter identified? Yes Zone(s) of Contamination Identified? No

Proposed On-Site Activities (indicate on map if possible): Drilling, soil and rock sampling; installation and sampling of monitoring wells; Ranney Well and Purge Well sampling; surface water sampling; performance of seismic refraction, electromagnetic survey and ground penetrating radar; air control and borehole surveys.

Recommended Level of Protection: Level D, modified level C

Protective Clothing: Hard Hat, Steel Toe & Shank Boots, Rain Suit, or Disposable Coveralls, Goggles, or Safety Glasses with side shields.

Modification: Use of APR's and modifications to protective clothing based on site activities and monitoring data

Monitoring Equipment and Materials: AID Model 580 Portable Organic Vapor Meter w/10.0eV lamp; Draeger tubes for vinyl chloride.

Decontamination and Disposal:

Decontamination Procedures: (X) level to be utilized

_____ Level A - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, suit/safety boot wash, suit safety boot rinse, (Tank Change), safety boot removal, suit and hard hat removal, inner glove wash, inner glove removal, inner clothing removal, field wash, redress.

_____ Level B - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, suit/safety boot wash, suit/SCBA/boot/glove rinse, (Tank Change) safety boot removal, (splash suit removal) SCBA backpack removal, inner glove wash, inner glove rinse, face piece removal, inner glove removal, inner clothing removal, field wash, redress.

_____ Level C - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal suit/safety boot wash, suit/safety boot rinse (Canister or Mask Change), safety boot removal, splash suit removal, inner glove wash, inner glove rinse, face piece removal, inner glove removal, inner clothing removal, field wash, redress.

__X__ Level D - Segregated equipment drop, boot and glove wash, boot and glove rinse.

Modifications (include to be used): Level C available; full protective clothing wash/rinse not required due to low level of contamination

Special Equipment, Facilities, or Procedures: Seismic refraction studies will utilize explosives due to depth of rock layer (100-120 feet deep)

Site Entry Procedures: None; Site in use by general public without any known ill-effects

Work Limitations (Time of Day, etc...): Daylight; boreholes to be drilled away from fairways and greens

Investigation-Derived Material Disposal: Drill water to be disposed of in Golf Course ponds which are permitted to discharge into Wanticoke Creek, disposable protective equipment to be disposed as ordinary trash.

TAMS CONSULTANTS, INC.
SITE SAFETY PLAN

D. PERSONNEL AND RESPONSIBILITES

		NAME	RESPONSIBILITY
TAMS / GZA	1.	Albert DiBernardo	Project Manager
	2.	Patrick Sorensen	Health and Safety Officer
	3.	James Okun	Project Toxicologist
	4.	Ray Kampff	Deputy Project Manager
	5.	Ray LaPort	Site Manager/Site Safety Officer
	6.	Martin Derby	Field Inspector
OTHER	1.	Ann Jeffries	Analytical QC/QA
	2.	Jutta Hager	Project Manager - Seismic Surveys
	3.		

E. EMERGENCY PLANNING

Emergency Information:

Office: Superintendent of P/W
1009 East Main St. Municipal Bldg., Endicott, N.Y.

Ambulance (Name): Union Volunteer Emergency Service 757-2493

Hospital (Name): UHS Medical Center Emergency 754-7171

Police (Local or State): Local: 757-2474

Fire Department (Name & Volunteer?): Watch Desk 757-2464

Explosives Unit: 757-2464

Radio Channel: None

Nearest Phone: In Command Post; Number Not Available

Project Manager: Albert DiBernardo

Site Manager: Ray LaPort

Site Safety Officer: Ray LaPort

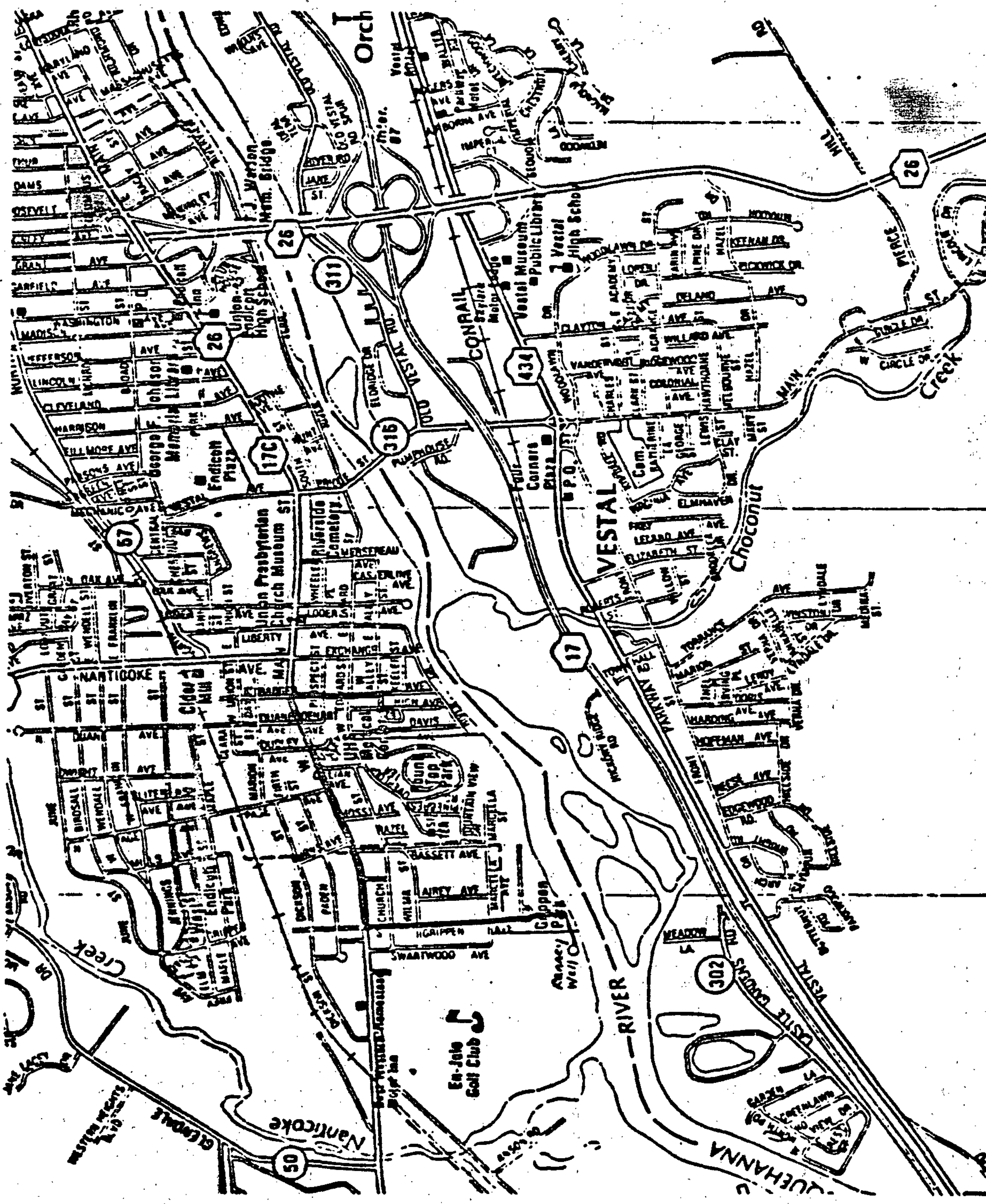
TAMS CONSULTANTS, INC.
SITE SAFETY PLAN

Emergency Contacts: (Medical and Health)

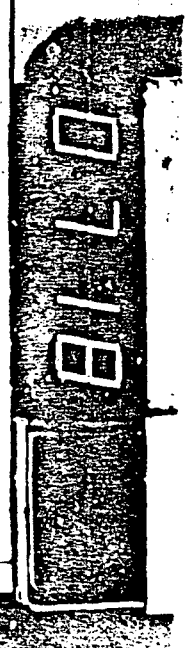
o Dr. J. Maslowski (TAMS' Consulting Physician)	(212) 489-6920
o E.P. Sorensen (TAMS' Health and Safety Officer)	(609) 426-0537 (Home)
o E. O'Brien (TAMS' Partner-in-Charge)	(201) 391-8775 (Home)
o Corporate Health Examiners	(212) 489-6920
o Poison Information Center	
New Jersey	(609) 292-5666 800-962-1253
New York	(518) 474-3664
o National Response Center (FOR ENVIRONMENTAL EMERGENCY ONLY)	(800) 424-8802
o TAMS OFFICE	
New York	(212) 867-1777
Bloomfield	(201) 338-6680

Directions to Hospital (Attach Map):

From Command Post at Ranney Well, go north on S. Grippen Avenue to Route 17C (West Main Street). Go right on Route 17C to Badger Avenue. Turn right on Badger to West Valley Street. Turn right on West Valley Street to High Avenue. UHS (United Health Services) Medical Center on 600 High Avenue.



Route to United Health Services Medical Center from Ranney Well



APPENDIX A

EXCERPT FROM TAMS' HEALTH AND SAFETY MANUAL

4.4 Site Assessment

The key to identifying site hazards prior to performing remedial action is a site assessment. A site inspection is the first order of business for remedial work on a hazardous materials site. Inspecting the site is done in two parts. First, site characteristics are identified without actually entering the facility. Key information sources include:

- o History of site from local officials, government agencies or owners including:
  - Ownership - to get information on site;
  - Permits issued/denied/restrictions - to determined waste type and volumes;
  - Customers and haulers - to determine waste types and volumes;
  - Waste and volume - to determine hazard potential;
  - Site location of waste - to develop sampling and analysis plan;
  - Media reports - to get information on site;
  - Government and legal case histories - to obtain information on site.
- o Maps from U.S. Geological Survey or local surveyors showing:
  - Geographical information - for distances to hotels, hospitals, fire, ambulance, etc;
  - Geological information - for waste leaching;
  - Terrain - for footing hazards, material handling access;
  - Survey information - for accurate sampling and waste locating;
- o Previous action by owner or government such as:
  - Environmental analysis results - for possible contaminant;
  - Waste analysis results - for possible contaminants;
  - Health studies - for possible health effects;

Review of the results of this research is used to determine the kinds of hazards to be expected, the types of protective equipment needed to enter the site, the size of control zones used to minimize personnel exposure, wastes to be expected, preliminary cleanup plans, disposal options, and priorities for further study.

The second step is on-site inspection. The need for protective equipment will be determined by hazards discovered during the off-site information search. A detailed discussion of the types of protection needed by inspection and sampling personnel is included in the safety plan.

Information to be collected during site inspection of a hazardous waste site includes:

- o Radiation using the following procedure: (Record all readings).
  - Grid area and sweep grids with a survey meter or counter;
  - Readings over 0.3 mr/hr indicate possible presence of a radiation source;

- Readings over three mr/hr noted on a site map and reported to SM for further investigation (map three mr/hr boundary);
- If reading over 10 mr/hr occur, evacuate to a safe distance (three mr/hr level) and consult with radiological safety expert.

o Air contaminants by:

- Sampling ambient air for toxic materials;
- Sampling enclosed tanks, buildings, and spaces for toxic materials, oxygen content, and combustible gases;

o Waste container investigations by recording:

- Container label information;
- Volumes of wastes per type;
- Types of containers;
- Types of wastes (gas, liquid, solid mixtures).

o Site characteristics including:

- Dimensions;
- Topography;
- Security;
- Weather;
- Hydrology;
- Waste location;
- Buildings;
- Treatment facilities;
- Equipment types and locations.

4.5 Hazard Evaluation

Once the hazards have been identified, they must be ranked in order to determine action needed to eliminate or minimize the dangers. Hazard evaluation can be divided into two categories:

o Hazards due to physical condition of the site.

o Hazards due to the toxicity of wastes encountered.

4.5.1 Physical Site Condition

Hazards resulting from the physical condition and operations on site will nearly always be the easiest to discover and eliminate. Examples of these hazards and solutions include:

o Open pits - guard with barricades or fill in;

o Unstable material stacks - overhead guarding of equipment, protective clothing for spills, cribbing, or restacking;

o Lagoons, ponds, streams - protective footwear and clothes, rescue devices (lifeline);

- o Cold, snow, ice - antislip footwear, warm clothing, scheduling of work and rest periods, extra planning and manpower, and hot meals;
- o Heat, humidity - extra supervision to ensure protective materials are worn, scheduling of work and rest periods, and extra planning and manpower;
- o Confined spaces - air analysis for hazardous materials, oxygen content, and combustible gas concentrations with use of protective gear for hazardous materials found, and use of rescue devices and standby personnel;
- o Spills - planning, operation procedures protective equipment, and clean-up;
- o Loose objects - hard hats, safety shoes, body guards, and machine guards;
- o Striking against structures - machine guards, handrails,and proper footwear and walking surfaces;
- o Entrapment in or between equipment - machine guards, training in equipment use, and movement alarms.

Elimination of most of these physical risks is accomplished by appropriate engineering controls or use of the protective equipment issued to each employee. Use of powered mechanical equipment is limited to those people specifically trained and appropriately licensed and only at the direction of the SM.

4.5.2 Waste Toxicity and Hazards

Hazards resulting from wastes encountered depend upon their toxicity and the probability of personnel exposure. Since the toxicity of the materials is uncontrollable, the probability of exposure must be minimized. Categories of personnel protection required depend on the degree of hazard and probability of exposure by a route of entry into the body.

Toxicity is related to the amount of material needed to produce an effect on the health or behavior related to the person exposed. Toxicity can be scaled using several rating systems including TLVs, PELs, and the dose (LD_{50} for liquids or solids) or concentration (LC50 for gases) needed to kill one-half of a group of test animals. Table 4-3 provides a toxicity scale or gross relationships between LD50, LC50, toxicity descriptions, and human lethal dose.

The degree of hazard integrates toxicity and probability of exposure. For example, walking by a sealed drum of highly toxic material several times is less hazardous than drinking a lethal dose of a relatively harmless material. Exposure to toxic materials can occur by inhalation, absorption, ingestion, and injection.

Inhalation is the most probable method of exposure to toxic materials on hazardous waste sites. Equipment for respiratory protection ranges from

TABLE 4-3

TOXICITY SCALE

Description	Hazard Grade	Oral LD_{50} (gm/kg	4-Hr. LC_{50} (ppm)	Probable Skin LD_{50} (gm/kg)	Human Lethal Dose
Extremely Toxic	4	0.001	10	0.005	Taste
Highly Toxic	3,4	0.001-0.50	10-100	0.005-0.043	4cc
Moderately Toxic	2,3	0.05-0.5	100-1,000	0.044-0.34	30g
Slighly Toxic	2	0.5-5	1,000-10,000	0.35-2.81	250
Practically Nontoxic	1	5-15	10,000-1000,000	2.82-22.6	500g
Relatively Harmless	1	15	100,000	22.6	500g

Source: Handbook of Toxicology, Vol. F, "Acute Toxicities," W.S. Spector, Ed., W.B. Saunders Co., Philadelphia, 1965.

pressure demand, self-contained breathing apparatus (PD-SCBA) to air-purifying dust respirators. Skin and eye absorption is next most probably route of exposure because of material handling or contact with contaminated protective equipment. Use of suitable protective garments, eye and face protection, and personal hygiene is required. Ingestion can occur when sanitation and personal hygiene are neglected or when food or drink are contaminated with toxic materials. Cleaning of all equipment and personnel, segregation and proper disposals of contaminated materials, and banishment of food and beverages from the waste site are required here. Injection of toxic materials is possible when protective coverings and the body are pierced by contaminated materials. Examples include cuts form contaminated sharp metal, broken glass, and nails. Care must be taken to eliminate or guard against this route of exposure. All injuries must be treated by a person trained in first aid and reported to the SM to allow evaluation of possible exposure, determination of additional treatment, and to help reduce similar future exposures.

4.5.3 Dermal Protection

Prior to on-site arrival, adequate personnel protective equipment must be selected by the team leader for conducting field inspections and operations. For adequate protection against possible exposure to hazardous materials, the team leader must have available protective clothing, respiratory protection, and first aid equipment. In selecting this equipment, the following basic decision process should be used:

- Review all evidence of potential exposure before entry into the site. This review should include any information available concerning the site and the hazardous waste handled;
- Review all toxicological information before entry, including references such as "CHRIS" (Chemical Hazards Response Information System of the U.S. Coast Guard), "Hazardous Properties of Industrial Materials" by N.I. Sax, "Registry of Toxic Effects of Chemical Substances," and EPA OHM-TADS;
- After reviewing the available environmental and toxicological information, choose protective clothing accordingly.

The following sections discuss the proper selection of the required personnel protective equipment for use on hazardous waste disposal sites.

Protective clothing must be worn by all field personnel to prevent skin exposure on suspended or confirmed hazardous waste sites until sufficient data have been acquired to enable the team leader to make an informed judgment regarding the need thereof. In the absence of clear indications that work can proceed safely without protective clothing, required items include fully encapsuled suits or chemical-resistant pants and jacket, rubber boots, protective gloves, hardhat or head cover, and face shield or chemical safety glasses.

Once adequate protective clothing has been chosen, field personnel must also be cognizant of the fact that alertness is a significant safety factor. Protective clothing is cumbersome, hastens the onset of fatigue, can offset alertness, and limits work time. As an example, imagine the site

being worked on contains atmospheric contaminants ultimately dangerous to life and health through skin exposure and the use of maximum-level clothing protection is required. In these cases, a totally encapsulated suit must be worn by team members who enter the contamination zone. Depending on temperature, maximum daily work time may be only 30 minutes before fatigue becomes a hazard.

It should be recognized that no one type of encapsulated suit or protective clothing will be adequate for all possible uses because of the permeability factors of the materials used. Several suits are available on the market today. These different suits are made of nitrile rubber, neoprene rubber, PVC-coated nylon, polyurethane-coated nylon, CPE, and butyl rubber.

Both disposable clothing and reusable clothing are available. Each has advantages and disadvantages. Presently available disposal clothing is more easily torn than reusable clothing and disposable shoe covers are of limited value on rough ground or in walking through snagging objects. Reusable clothing is tougher but must be decontaminated after use.

4.5.4 Respiratory Protection

OSHA's General Industry Standards, 29 CFR 1910.134, state that respirators shall be selected on the basis of the hazards to which workers are exposed and that ANSI Z88.2 shall be used for guidance in their selection. OSHA also requires that approved or accepted respirators may be used when available based upon 30 CFR 11,14 and 14a. Selection of respiratory equipment for use in hazardous waste disposal site operations must be guided by considerations of risk to life and health, the nature of the equipment available, and relative comfort and ease with which work may be performed while protected.

Selection of the proper type of respirators for use in on-site activities shall be based upon the following criteria:

- The type of respiratory hazards, including physical properties, physiological effects on the body, concentrations of toxic material or airborne radioactivity level, established permissible time-weighted average for toxic materials and oxygen levels.
- The location of the hazardous area in relation to the nearest area having acceptable respirable air.
- The period of time for which respiratory protection must be provided.
- The anticipated work loads of field personnel.
- The physical characteristics and functional capabilities and limitations of the various type of respirators.

In order to select the appropriate minimum level of respiratory protection, quantitative data on air quality must be available. In many instances during the initial entry into hazardous waste sites, potential respiratory hazards have not been quantified. It must then be assumed that

the unknown atmosphere is immediately dangerous to life and health and oxygen defficient. In many cases, other agencies will have previously entered the hazardous waste site, and the level of respiratory protection may be modified in light of previous experience.

OSHA, in the latter situation, requires that positive pressure modes, self-contained breathing apparatus (SCBA) must be used, per 29 CFR 1910.134 and ANSI Z-88.2 (Revised). Therefore, when personnel enter a hazardous waste site with unknown air contamination, they must use SCBA. Only National Institute of Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA)-approved, positive-pressure demand SCBA are acceptable. At this time only Mine Safety Appliance (MSA), Scott, and U.S. Diver (Survivair) offer approved equipment.

There are cases where the site entry team will visit a hazardous waste site when the concentration of oxygen and contaminants are known, based upon adequate sampling and analysis procedures. In these situations, the OSHA regulations and ANSI Z-88.2 (Revised) guidelines prescribe specifically allowable respiratory protection as follows:

- Atmospheres which are oxygen deficient (less than 19.5 percent O_2).

In these atmospheres, OSHA requires that respirators which provide an independent sources of respirable air must be used; i.e., SCBAs.

- Atmospheres which are "Immediately Dangerous to Life and Health (IDLH).

In atmospheres encountered that contain adequate oxygen but are immediately dangerous to life and health as defined in ANSI Z-88.2 because of the presence of toxic contaminants, only respirators which provide an independent source of respirable air under positive pressure may be used. If adequate sample analyses demonstrate that IDLH conditions exist at a site, the entry team should withdraw from the area and notify EPA, state and local authorities.

- Atmospheres which are not immediately dangerous to life and health

If atmospheres contain adequate oxygen (above 19.5 percent) and contain only contaminants with good warning properties (taste, smell, irritation) and are not immediately dangerous to life and health because of the presence of toxic contaminants, air-purifying respirators can be used.

Air-purifying respirators operate by drawing air through canister or cartridge filter medias designed to remove particulates, vapors and gases, radionuclides or combinations of particulate/gas/vapor. Only approved NIOSH/MSHA cartridges can be used in these respirators and only filters specifically provided for an individual manufacturer's air-purifying respirator. NIOSH/MSHA approved air-purifying respirators are manufactured in 1/4, 1/2 and full-face mask models. Advantages and disadvantages deal primarily with degree of fit, comfort, and the need for eye protection.

In atmospheres, where air-purifying respirators are used and the possibility of increased concentration of toxic substances exists, OSHA requires that an emergency escape mask be provided for all field personnel. Thus, when air-purifying respirators are used for entry into hazardous waste sites, NIOSH/MSHA approved emergency escape masks must also be carried.

OSHA also requires that each person using an air-purifying respirators respirator undergo a qualitative fit test using the particular device selected. Because of the wide variety of facial characteristics of field personnel and the wide array of respirator manufacturers, no mask shall be issued to field personnel until a proper fit test of the individual to the specific device is made. Field personnel must feel comfortable with the device. A qualitative fit test should be conducted using isoamyl acetate first and then irritant smoke (stannic chloride) while wearing the selected model.

Only NIOSH/MSHA approved cartridges for the selected mask and model can be used. The canister types include particulate filters, vapors or gas removing filters, radionuclide filters, combination particulate/gas/vapor and radionuclide filters and high efficiency filters.

Remember that when the encountered contaminants do not possess good warning properties or are apt to break through the filters, only positive-pressure SCBAs shall be used.

- Phase - may be hard to handle due to the physical state of material.
- Vapor pressure - may be fire hazards, explosion hazard, or suffocation hazard by displacing air.
- Vapor density - may be fire hazard and suffocation hazard if material displaces area.
- Solubility in various materials - may dissolve protective equipment or container.
- Melting point - may become in liquid during handling, causing a spill or exposure
- Boiling point - may boil at ambient temperatures releasing toxic gas vapor.
- Reactivity - may generate heat or toxic gases.
- Radioactivity - may injure upon exposure.
- Flash point - may be fire and explosive hazard.

Not all of these properties will be important for each waste encountered. The point is to recognize which properties are important for each waste encountered and then to control the hazards associate with those properties. Most commonly, concern is given to a material's fire and explosion potential and its reactivity.

Flammable liquids are classified by flash point (fp). Flash point is the temperature at which a sufficient amount of vapor is produced by a burnable liquid so that an ignition source (spark or flame) will cause a fire to start. Liquids are classified as either flammable (fp≤37.8°C) or combustible (Fp>37.8°C). Some materials (liquid or solid) will also spontaneously start burning at elevated temperatures. These are called auto-ignitable materials. Fires are controlled and extinguished by eliminating any one of the four requirements needed for fire: heat, fuel, reaction, or oxygen. Fire extinguishers eliminate either the heat (water) or the reaction (dry chemical). One reminder is to be aware of the reactivity of the extinguishing materials used on fire, especially when using water to extinguish the fire. Many materials react with water causing a more serious problem. Water may also dissolve the hazardous material creating a toxic effluent which is more hazardous than the fire and associated air pollution.

Reactivity of waste materials is also important when sampling or handling materials. Care must be taken to be sure materials cannot react with sample or analysis gear, personnel protective equipment, air, or body tissue.

4.6 Site Safety Plan

A site safety plan must be prepared (or reviewed) by experienced personnel for each on-site event involving hazardous substances. For remedial action at abandoned hazardous waste site, safety plans should be developed simultaneously with the site work plan and implemented when remedial actions begin. Emergency situations may require verbal safety instructions and the use of standard operating safety procedures until specific safety protocols can be written. For any incident, the plan must include health and safety considerations for all activities required at the scene. The safety plan must be periodically reviewed during extended field operations to keep it current and technically correct.

All field team members should be thoroughly familiar with the site safety plan. The Site Manager(SM) or the Site Safety Officer(SSO) will assemble the known facts concerning the site and will prepare preliminary plans. The preliminary plan will be reviewed by health and safety staff. The final site safety plan will be generated at this review.

4.6.1 Minimum Requirements

As a minimum, the site safety plan must—

- Evaluate the risks associated with the site and with each operation conducted.
- Identify key personnel and alternates responsible for both site safety and response operations.
- Address the levels of protective equipment to be worn by personnel during various site operations.

- o Designate work areas (exclusion zone, contamination reduction zone, and support zone), boundaries, size of zones, distance between zones, and access control points into each zone.
- o Establish decontamination procedures for personnel and equipment
- o Determined the number of personnel and equipment in the work zones during initial entry and/or subsequent operations.
- o Implement a program and make arrangements with the nearest medical facility (and medical life squad unit) for emergency medical care for routine injuries and toxicological problems).
- c Train personnel for any nonroutine site activities.
- o Consider weather and other conditions which may affect the health and safety of personnel during site operations.
- o Implement control procedures to prevent access to the site by unauthorized personnel.

4.6.2 Emergency Planning

An emergency plan covering the most probable emergency situations must be developed as part of the safety plan. Personnel must be trained to perform the plan. Typically, an emergency plan will need to consider:

- o Fire/explosion
- o Injury/poisoning
- o Chemical spill
- o Evacuation procedures

Each emergency plan will require a chain-of-command, development of required response action, identifying response teams, posting of a list of local emergency agencies in all mobile offices/trailers, identifying site medical personnel, and reporting procedures. Reports must be made for all incidents involving injuries property damage. Reports will be completed by the SM as soon after the incident as possible and forwarded to appropriate management and safety personnel. Injuries requiring medical treatment beyond first aid must be reported within 24 hours by phone, followed by a written report.

4.6.3 Incident Reports

Personnel hygiene at hazardous waste sites is of utmost importance. Daily clothing changes and frequent body washing are essential to minimizing exposure to hazardous materials. First aid for even minor cuts and scratches is necessary to help reduce the possibility of greater problems later. All accidents and injuries, even first aid, shall be reported to the SSO for recording. Table 4-5 provides an incident report form. Reportable accidents include near misses where the potential of damage or injury was present, accidents involving property damage, and accidents involving

TABLE 4-5
TAMS CONSULTANTS, INC.

INCIDENT REPORT
(PAGE 1 OF 2)

PERSONAL INFORMATION DATE: _____

Name: _____ Age: _____ Sex: _____

Home Address: _____ Employee No.: _____

_____ Home Office: _____

Home Phone: _____ Position/Title _____

SITE INFORMATION

Site Name: _____ Project No.: _____

Location: _____ Project Manager: _____

Location: _____ Safety Officer: _____

Hazardous materials on site: _____

Activity on site: _____

INCIDENT INFORMATION

Date of incident: _____ Time: _____

Type: _____ Exposure
_____ Possible Exposure
_____ Physical Injury

Brief description of injury/exposure and area affected: _____

_____

Where onsite did the incident occur? _____

_____

What was the employee doing at time of incident? _____

_____

What caused the incident? _____

_____

Additional contributary factors: _____

_____

Names of other individuals involved/exposed: _____

_____

Witnesses: _____

TABLE 4-5

TAMS CONSULTANTS, INC.

INCIDENT REPORT
(PAGE 2 OF 2)

Was the employee in compliance with protective clothing and equipemnt as defined in the site safety plan? Yes _____ No _____

If "no", how and why did the protection differ? _____

_____

Did the incident require improper removal of protective equipment in an area of potential exposure? Describe: _____

_____

_____

RESPONSE

Persons informed of incident: _____

Was medical attention received? Yes _____ (Date) _____ No _____

Briefly describe attention received: _____

_____

Where? (include address) _____

_____

Physician's Name: _____

Preventive measures to avert recurrence of the type of incident:

_____

_____

_____

PROVIDE ADDITIONAL INFORMATION ON THE BACK OF THIS FORM.

ATTACH ALL OTHER RELEVANT INFORMATION.

_____ Employee Signature	_____ Date
_____ Site Safety Officer	_____ Date
_____ Project Manager	_____ Date

injuries. All accidents must be reported to the HSO within 24 hours, those involving major equipment damage and/or injuries requiring hospital care will be reported to the PIC as well. An incident follow-up report will be completed within one month, or as soon as practical, after an incident report is completed. Table 4-6 provides an incident report follow-up form.

4.7 Site Operations

Operating on a hazardous waste site requires a coordinated movement of equipment and personnel during startup, a regular flow of supplies and supporting personnel during operation, and demobilization of all operations after job is finished. Preplanning for mobilizing people and equipment is essential to rapid, trouble-free site setup. Maintaining equipment between operating periods is key to preventing problems when equipment is needed.

4.7.1 Startup

A Site Manager (SM) will be designated prior to work on any site project. The SM is responsible for all aspects of work on site and will report to the Project Manager. Several items which require the SM's attention during project startup include:

- Site assessment.
- Work plan preparation.
- Site personnel selection.
- Necessary equipment to site.
- Procuring site utilities.

4.7.2 Operations

Site operations will be conducted according to the approved work plan. SMs are responsible for implementation of the work plan. Site operations depend on the personnel working on the site, support from base personnel, and equipment operation. Site personnel will require:

- Places to live.
- Places to eat.
- Personal hygiene facilities.
- Transportation to/from the site.
- Rotation to permanent residence.
- Safe working conditions.

SMs are responsible for procuring and maintaining these requirements. Base personnel provide the backup, expertise, supplies, and funds needed by site personnel. Base support functions will be written into the work plan.

TABLE 4-6

TAMS CONSULTANTS, INC.

INCIDENT REPORT FOLLOW-UP

Date of Incident: _____

Name: _____ Employee No.: _____

Site: _____ Project No.: _____

Outcome of incident: _____

Physician's recommendations: _____

Date returned to work: _____

ATTACH ANY ADDITIONAL PERTINENT INFORMATION TO THIS FORM

SMs will advise the Project Manager regarding additional support or materials needed after site operations commence.

The SM must see that all on-site employees have received their initial and site-specific training, know the tasks to be performed, and are medically qualified to perform the tasks. A record of personnel assigned to each site and their tasks must be kept in the work plans for each site. Management personnel may audit site operations, safety, quality assurance, and progress on a periodic basis using both announced and unannounced visits.

4.7.3 Demobilization

SMs must give as much attention to leaving a site at end of project as to arriving at a site. Time and effort to properly clean equipment, perform maintenance necessary for storage, and leave the site neat and clean will be rewarded through increased equipment reliability, extended equipment life, and community and owner goodwill. Operating personnel must be advised of the importance of demobilizing to counteract the natural tendency of enthusiasm and productivity to slacken after the actual site work is finished.

SMs must specifically consider demobilizing the following items:

- Equipment.
- Utilities.
- Personnel housing.
- Site offices.
- Vehicles.

4.8 Work Practices

The work practices specified in this section must be used by all Waste Management personnel.

4.8.1 Personnel Practices

- Protective Clothing - Protective clothing must be worn by all personnel while working in areas of suspected or confirmed dermal hazard unless sufficient data has been acquired to enable the SM to make an informed judgment that protective clothing is not needed. In the absence of clear indications that work can proceed safely without protective clothing, required items include chemical-resistant pants, jacket, boots, gloves, and hardhat or head cover, and may include a fully encapsulating chemical protective suit. SMs must also consider the potential hazards of wearing protective clothing since protective clothing is cumbersome, hastens the onset of fatigue, increases heat stress, and increases the time the personnel must spend in the high-risk area.

- Heat Stress - Employees must compensate for the increased heat stress caused by wearing protective clothing in hot weather in order to prevent the onset of heat-induced illnesses. Employees must maintain an appropriate work-rest regimen and water and salt balances.

- Eye Protection - Devices to provide appropriate eye protection must be worn on any task where the danger of eye injury exists and should meet ANSI Z87.1, "Practice for Occupational and Educational Eye and Face Protection."

- Forbidden Practices - The following practices are expressly forbidden during field operations:

  - Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases that probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated contaminated.

  - Ignition of flammable liquids within, on, or through improvised heating devices (barrels, etc.) or space heaters.

  - Approach or entry into areas or spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment available to enable safe entry.

  - Medicine and alcohol can potentiate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel on response operations if there is a likelihood of such potentiation.

  - Conduct of on-site operations without off-site backup personnel (Site Managers may exercise informed judgment regarding the need for off-site backup at active sites, or in cases where sites have been repeatedly entered or occupied without apparent harm. In any case where doubt exists, backup personnel must be present).

- Personal Hygiene - All personnel must wash the affected area immediately after obvious contact with a hazardous substance, report incident to SM, and seek appropriate medical care or testing.

- Personnel and equipment in the contaminated area should be minimized, consistent with effective site operations.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- No excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protective equipment.

- Contact with contaminated surfaces or with surfaces suspected of being contaminated should be avoided. Whenever possible, one should not walk through puddles, mud, and other discolored surfaces; kneel on ground; lean, sit, or place equipment on drums, containers, vehicles, or the ground.

4.8.2 Operational Practices

- Information Review and Reconnaissance - The Safety Plan for a field investigation must be basel upon a thorough evaluation of existing data and review of follow-up reports from previous investigations. The information search may indicate possible chemical hazards such as the presence of incompatible chemicals, toxic gases, explosives, etc. Such indications may provide insight to specific safety precautions needed. Similarly, a perimeter inspection or aerial imagery, followed by an on-site reconnaissance, may reveal safety hazards requiring special attention.

  Investigators and response personnel will normally become better able to specify appropriate safety precautions as they get progressively closer to, and measure, hazardous materials in air, runoff, ground water, soil, spilled material, barrels, etc.

- Protection Levels - Although the SM must determine the level of protection which is appropriate for each task, four specific protection levels have been provided as benchmarks for the SM. The SM must select a level based on available information.

- Zones - Two or more zones must be established, clearly delineated, and posted:

Decontamination Zone- During operations on a suspect or known hazardous waste site, a zone must be established for decontamination of equipment and personnel and access control just outside the area of suspected contamination. At least one employee will remain in this zone to:

- Assist in emergency removal of personnel from the HWS in the event of accident or injury. The backup must have readily available protective clothing, breathing apparatus, first aid equipment, and communications.
- Assist in moving equipment, samples, and supplies.
- Provide communication to emergency units.
- Assist in decontamination or removal of contaminated clothing from the individuals emerging from the contaminated area.
- As appropriate, prevent entry of unauthorized persons to the HWS while operations are underway.
- Provide other assistance as necessary, but with the primary objective of facilitating safe transfer of personnel and equipment to and from the affected area.

Contamination Zone (s)- The area(s) which contains, or is suspected of containing, hazardous materials must be clearly delineated and posted. The SM may establish more than one contamination zone for areas of different levels of potential personnel hazard. Only persons authorized by the SM may enter a contamination zone.

- Radioactivity and Explosivity - All Hazardous Waste Sites must be checked for radioactivity and explosivity during first entry onto the site. Normal background radioactivity is approximately 0.01 to 0.02 mR/hr. Detecting levels of activity significantly greater than normal background is cause for a careful survey of the entire site; if levels above two mR/hr are encountered, the advice of a competent radiation health physicist should be sought before continuing operations on the site.

If explosivity readings less than 10 percent Lower Explosive Limit (LEL) of methane are detected, continue surveys of the area. Ambient readings approaching or exceeding 10 percent LEL are cause for immediately withdrawing personnel and notifying the emergency, fire; and explosion units. The SM must be consulted before continuing operations.

- Buddy System - A minimum of two employees, in constant communication (either visual or voice) with each other, are required to perform any work in contamination zones.

- Sampling Procedures - Sampling procedures must minimize the risk of personnel exposure to hazardous materials during sampling, packaging, shipping, and analysis; and minimize the risk of exposure of others to spilled or residual waste materials. Disposal sampling equipment should be used wherever possible.

- Sample Handling - Samples of runoff, ambient air, or ground water may be moved directly into laboratories and handled with normal safety precautions, unless the SM determines that special handling is appropriate. However, samples of liquids or solid materials removed from containers or obviously contaminated spill areas must be assumed to be hazardous materials and handled accordingly.

- Use of Respirators as Personal Protective Devices - A respirator use program must be provided for investigators and personnel who enter areas where a potential for inhalation exposure to a hazardous material is present. This program will meet the requirements of the OSHA General Industry Standards for respiratory protection as detailed in 29 CFR 1910.134. The respirators must be certified in accordance with the requirements of the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR 11.

- Use of Respirators - This section provides procedures which must be followed for field activities, these are not a substitute for the respirator use program described directly above.

Self-Contained Breathing Apparatus (SCBA)- SCBA must be worn on-site when:

- Containers of unknown or known hazardous materials are being opened

- When in enclosed spaces where hazardous materials are present, such as abandoned waste chemical storage buildings or manholes which have received spilled chemicals

- When the SM judges that the concentration of hazardous materials in the air is greater than 10 times the OSHA Permissible Exposure Limit (PEL)

Cartridge Respirators- Cartridge respirators, which are easier to use, but provide less protection than SCBAs, can be worn on-site only when:

- Hazardous materials in the air are not greater than 10 times the PEL, and have good warning properties

- The SM judges that respirators are needed as a precaution against generation of low levels of toxic substances in air due to sampling, handling, decontaminating, or other operations

- Time periods that will not exceed the capacity of the cartridge

- Measurements have verified that at least 19.5 percent oxygen is present

Carrying Respirators- Cartridge or emergency escape respirators must be carried on-site when the SM judges that, although the risk is very low, hazardous materials may become present in the air during operations. The respirators must be donned immediately upon experiencing any of the warning properties described immediately above. The user must leave the site immediately after donning an escape respirator or if the warning properties persist after donning a cartridge respirator.

- o Sampling Equipment - As a general rule, sampling equipment used on an Hazardous Waste Site should be disposable. Sampling instruments and other nondisposable equipment should be kept clean with disposable protective covers. Dippers, scoops, and similar devices for solid samples should be placed in plastic bags for disposal or later decontamination. Liquid samples from barrels or tanks should be withdrawn in inert tubing, such as glass, and tubing should then be broken and abandoned within the barrel or tank. If incineration or recycling of barrel contents is contemplated, the tubing may be disposed of in other suitable containers. The widely discussed disposable Composite Liquid Waste Sampler (or "Coliwasa") is ideal for sampling in certain instances.

- o Decontamination - Whenever possible, equipment should be decontaminated prior to leaving the work area. Equipment which cannot be decontaminated at the scene must be double-bagged and trans-

ported to another area for eventual decontamination. Where possible, verify completeness of decontamination with sniffers, swipe tests, or other appropriate tests.

- Packaging and Shipping - Hazardous materials must be packaged to withstand shocks, pressure changes, and any other conditions which might cause leakage of contents incident to ordinary handling during transportation. Shipments of hazardous materials must be in accordance with DOT regulations.

- Leaving the Site - Procedures for leaving the suspect contaminated area must be planned before entry. Provision must be made for: decontamination and safe packaging of protective clothing; disposal or packaging of disposable gear; handling of samples and preparation of samples for shipment; transfer of equipment, gear, and samples from the contaminated area to the clean area; etc. Sequences will depend on several variables—such as SCBA inside or outside of protective clothing—but must be worked out in advance.

- Monitoring Equipment - For immediate evaluation of potential health hazards, use direct reading instruments such as portable combustible gas and oxygen meters, photoionization meters, gas chromatographs, infrared spectrometers, radiation survey meters, and colorimetric detector tubes. The SM must be aware of the limitation of these portable direct reading instruments when characterizing the unknown chemicals at unknown concentrations at work areas.

- Decontamination - Procedures, equipment, and supplies for decontamination must be available on-site. The equipment and supplies must allow employees to wash exposed areas of their bodies as well as equipment or other items which have been in the contamination zone, and collect the washwater and other contaminated materials for disposal. The equipment must include at least an emergency eye wash and may include a personnel shower.

4.9 Chemical Compatibility

Cost-effective waste disposal involves bulking of waste materials found to be hazardous. The key to safe mixing of waste materials is their compatibility. Laboratory testing will identify the wastes, either by chemical class or by individual chemical identity. Several references may then be consulted to determine which wastes may safely be mixed for transport to a proper disposal site or for on-site treatment.

4.10 Decontamination Procedures

The need for personnel decontamination can vary greatly. Operations such as walking through a work area may require only a simple controlled undressing procedure and bagging of contaminated clothing. In operations in which extensive work is performed in a contaminated area, gross contamination of protective clothing and equipment can occur. In this case, a controlled undressing and bathing facility may be needed.

Transfer of hazardous materials to equipment and personnel working at sites is almost a certainty. Personnel are protected by clothing and other gear while on-site, but this gear must be removed when leaving the site. In order to restrict the migration of hazardous materials from the site, all clothing and equipment must be decontaminated.

4.11 Weather

Adverse weather conditions are important considerations in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Of particular importance is heat stress resulting when protective clothing decreases natural body ventilation. One or more of the following will help reduce heat stress:

- Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low-sodium diet.
- Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. Long cotton underwear acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing. It should be the minimum undergarment worn.
- Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.
- In extremely hot water, conduct nonemergency response operations in the early morning or evening.
- Ensure that adequate shelter is available to protect personnel against heat, cold, ration, snow, etc., which can decrease physical efficiency and increase the probability of accidents.
- In hot weather, rotate shifts of workers wearing impervious clothing.

4.11.1 Heat Stress Monitoring

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70°F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85°F, workers should be monitored for heat stress after every work period. The following are important considerations:

- Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the

beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.

- Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the OT exceeds 99.7°F at the beginning of the next period, the following work cycle should be further shortened by 33 percent. OT should be measured again at the end of the rest period to make sure that it has dropped below 99°F.

- Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighing; preferably the worker should be nude. The scale should be accurate to plus or minus 1/4 lb. BWL should not exceed 1.5 percent of the total body weight. If it does, the worker should be instructed to increase his daily intake of fluids by the weight loss. Ideally, body fluids should be maintained at a constant level during the work day. This requires replacement of salt lost in sweat as well.

- Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

4.11.1 Effects of Heat Stress

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Standard reference books should be consulted for specific treatment.

Heat-related problems include:

- Heat rash caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

- Heat cramps caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.

- Heat exhaustion caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

- o Heat stroke the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

4.11.3 Effects of Cold Exposure

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body or result in profound generalized cooling, causing death. Areas of the body that have a high surface-area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10°F with a wind of 15 mph is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of five mph increases to ten mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

- o Frost nip or incipient frostbite. The condition is characterized by sudden blanching or whitening of the skin.
- o Superficial frostbite. Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- o Deep frostbite. Tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: (1) shivering, (2) apathy, listlessness, sleepiness and (sometimes) rapid cooling of the body to less than 95°F, (3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, (4) freezing of the extremities, and, finally, (5) death.

Standard reference books should be consulted for specific treatments.

4.12 Waste Handling

Moving wastes found at a site is one of the most dangerous tasks during the cleanup process. The possibility of containers rupturing allowing contents to spill on personnel, mix reactively with other wastes, and increase the contamination of the environment is great. Additionally, hazards exist from operation of material handling equipment, stress from wearing protective gear, and danger of transportation-related accidents. Wastes which are to be moved should be inspected for:

- o Ease of equipment access;
- o Type of handling;
- o Safety equipment needed;
- o Container condition;
- o Transportation vehicle/container needed;
- o Transportation labeling;
- o Correct disposal method facility;

Efficient handling of the wastes requires segregating the wastes into types, prioritizing the wastes to be handled, identifying those wastes to the handling personnel, securely containing the wastes, and scheduling of personnel, equipment and transportation. In the interest of safety, those wastes which are the easiest to access and most securely packaged should be handled first. Removal of these materials allows greater access to and assessment of the wastes remaining. Judicious use of remotely operated equipment, shields, sorbent materials, and overpack containers is needed to cope with poorly-containerized wastes. Typically used equipment is listed in Table 4-7.

4.13 Waste Disposal

Site operations involving contact with hazardous materials such as sampling, lab analysis, or remedial action will generate contaminated materials needing disposal. For small quantities of waste material generated during inspection processes, such materials may be disposed of securely on-site. The flow chart in Figure 4-1 can be used to find the best disposal method for various waste types. Optionally, the wastes can be recycled, used as fuel, or used as a raw material for an industrial process. Materials with no commercial value may be landfarmed, landfilled, or incinerated, depending on toxicity. Disposal facilities must provide evidence of proper government permits needed to accept the waste and of adequate operational funding to maintain waste storage.

Transporting the waste to a treatment, storage, or disposal facility requires adequate equipment, proper permits, insurance, driver training, manifest forms, and shipping documents. Table 4-8 provides a checklist for selecting waste transportation and Table 4-9 shows the correct procedure for loading, labeling, and shipping wastes.

4.14 Site Monitoring

Site monitoring is used to detect changes in site contamination levels or personnel exposures. After the hazard assessment has identified the paths of potential environmental or personnel exposure to hazardous materials, a plan is developed to monitor those paths for contaminants. Typical monitoring covers:

- o Environmental sample analyses needed
- o Environmental sampling locations
- o Medical monitoring
- o Pollutant trigger levels
- o Data evaluation
- o Record keeping
- o Quality assurance

4.15 Site Access Control

Control and documentation of all site personnel, operations, management, inspectors, clients, and visitors is needed to minimize the risk of accidents and delayed health effects. All personnel must be logged on and off each site. Access to each control zone will be on an as-needed basis and authorized by the SM. All persons except TAMS, site owners, and client personnel will be considered visitors. Visitors will be permitted on the site only with client authorization stating purpose of visit and control zones eligible to visit. All visitors will be escorted by TAMS personnel while on the site. Every effort must be made to limit site access to only those persons needed to perform the project. Additional persons only increase the probability of exposure to hazardous site materials or other types of accidents.

5.0 TRAINING

Personnel training is performed so that employees are

- Aware of the hazards of their jobs and are able to perform their work in a manner where risk to personal health and safety is reduced to the greatest extent feasible.
- Aware that maximum concern for the health and safety of other workers, the public, and the environment is given.
- Aware of and comply with pertinent laws, rules, and regulations.
- Knowledgeable in the tasks they must perform so they react responsibly and are able to correctly respond to emergency situations.

Identifying problems which signal a need for formal training requires careful investigation of the problem causes. Many times, changes in equipment type or design, operating procedures, or physical layout are more appropriate solutions.

Personnel training necessary for personnel involved in waste management activities includes several areas:

- Introductory training to introduce the work needed to fulfill program objectives, describe the management and reporting system to be used, and provide technical information and skills needed to perform the work.
- Continuing training to introduce new ideas and equipment and to respond to unexpected situations, and for new employees.
- Refresher training to reinforce previous knowledge and skills and to correct undesired behavior.
- Site-specific training to cover special problems, procedures, and equipment.

The following subsections describe how the need for training will be identified and the material covered in each of the three training areas previously described.

5.1 Introductory Training

Introductory training will be provided to all field program personnel according to their duties and areas of need, as prescribed by EPA Executive Order 1440.2. Subjects to be covered during introductory training include:

- Superfund and other regulations

- o Safety and health program
- o Chemical and physical hazards
- o Toxicology
- o Dermal protection
- o Respiratory protection
- o Site operations
- o Monitoring instruments
- o Sampling and shipping
- o Community relations
- o Quality assurance

5.2 Continuing Training

Continuing training is provided to employees through periodic meetings or through specialized courses. Meetings are coordinated and scheduled by the HSO and provide an opportunity for reviewing problem areas, new ideas, new technology, and case histories. Employees are expected to attend as required by their work needs, they provide an excellent forum for soliciting and developing safety awareness and promoting morale.

5.3 Refresher Training

Refresher training is provided to reinforce correct behavior and to correct improper behavior. Refresher training will be provided by periodic refresher courses, which will be scheduled and provided by the HSO. Subjects will include those covered during Introductory Training as well as other subject needs identified. Refresher training will be provided as required by regulatory and operational needs.

5.4 Site-Specific Training

Site-specific training needs are provided in each site safety plan. SMs will make sure that all site personnel have received the necessary training. Those who have not must be trained and certified by the HSO prior to working on a specific site.

APPENDIX B

SELECTED TOXICOLOGICAL DATA FOR VOLATILE HALOGENATED COMPOUNDS DETECTED IN ENDICOTT WELLFIELD

APPENDIX B

Selected Toxicological Data for Volatile Halogenated Organic Compounds Detected in Endicott Wellfield

Vinyl Chloride

Formula: $H_2C{:}CHCl$ CAS # 75-01-4
TLV: 1 ppm, 5 ppm ceiling/15 minute (OSHA)
Target organs: Liver, CNS, respiratory system, skin and eyes suspected.
Exposure symptoms: skin, eye, and mucous membrane irritant, anesthetic, nausea, bronchial inflamation.
Carcinogen

Trichloroethylene

Formula: $HCl_2C{:}CH_2Cl$ CAS # 70-01-6
TLV: 50 ppm, 270 mg/m3
Target organs: Respiratory system, heart, liver, kidneys, central nervous system skin.
Exposure symptoms: Headache, vertigo, visual disturbance, tremors, somno lence, nausea, vomiting, eye irritation, dermatitis, cardiac arrhythmias, paresthesias.
Carcinogen

Chloroethane

Formula: C_2H_5Cl CAS # 107-06-2
TLV: 1000 ppm, 2600 mg/m3
Target organs: Liver, kidneys, respiratory system, cardiovascular system.
Exposure symptoms: Incoordination, inebriate, abdominal cramps, cardiac arrhythmias, cardiac arrest, liver and kidney damage.

1,1-Dichloroethane

Formula: HCl_2CCH_3 CAS # 75-34-3
TLV: 200 ppm, 810 mg/m3 (ACGIH)
(OSHA Permissible Exposure Limit (PEL) is 100 ppm)
Target organs: Skin, liver, kidneys.
Exposure symptoms: CNS depressant, skin irritant, drowsiness, unconciousness, liver and kidney damage.

1,2-Dichoroethylene

Formula: $HClC{=}CHCl$ CAS # 540-59-0
TLV: 200 ppm, 790 mg/m3
Target organs: Respiratory system, eyes, CNS.
Exposure symptoms: Eye and respiratory system irritant; CNS depression.
Suspected Carcinogen

Chloroform

Formula: $CHCl_3$ CAS # 67-66-3
TLV: 10 ppm, 50 mg/m3
Target organs: Liver, kidneys, heart, eyes, skin.
Exposure symptoms: Dizziness, mental dullness, nausea, headache, fatigue, anesthesia, hepatomegaly, eye and skin irritant.
Carcinogen

1,1,1-Trichloroethane

Formula: Cl_3C-CH_3 CAS# 71-55-6
TLV: 350 ppm, 1900 mg/m3
Target organs: Skin, CNS, Cardiovascular system, eyes.
Exposure symptoms: Headache, CNS depression, poor equilibrium, eye irritant; dermatitis, cardiac arrhythmias.

References for Appendix B

American Council of Government and Industrial Hygienists: Threshold Limit Values and Biological Exposure Indices for 1985-86. ACGIH, Cincinnati, OH, 1985.

Clayton, George D. and Florence E. Clayton: Patty's Industrial Hygiene and Toxicology, Volume 2C, 3rd Revised Edition. John Wiley and Sons, New York, 1981.

Sax, N. Irving: Dangerous Properties of Industrial Materials, 6th Edition. Van Nostrand Reinhold, New York, 1984.

U.S. Department of Health and Human Services and U.S. Department of Labor: NIOSH/OSHA Pocket Guide to Chemical Hazards (4th printing). U.S. Government Printing Office, Washington, D.C., 1981.

APPENDIX C

FIRST AID PROCEDURES

APPENDIX C

ADMINISTERING FIRST AID

Anybody who attempts to administer first aid to an injured person should remember that such treatment is only emergency care to be administered until professional medical aid can be obtained.

The primary rule to follow in all injury cases is to keep calm. In addition, follow these instructions:

- Send for help.
- Do not move an injured person until it is certain that he/she can be moved safely.
- Keep the patient quiet and warm.
- Maintain vital life functions (breathing and circulation).
- Observe and treat for shock.
- Identify the offending agent or poison, if possible.
- Do not give liquids to an unconscious person.
- Do not act without thinking; doing the right thing is more important than doing things in a hurry.

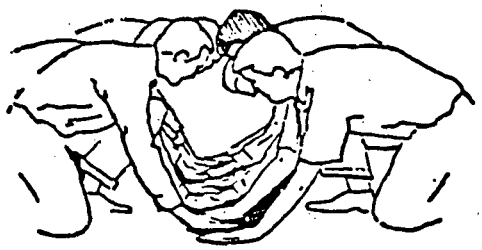
Report every injury, including minor cuts, scratches, bruises, burns, etc., to the employee's immediate supervisor. Employees injured in connection with their work should be seen immediately by the supervisor and, if necessary, be sent to a physician or hospital.

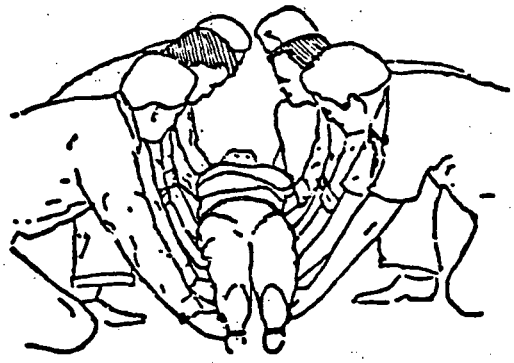
4.1 FIRST-AID KITS

As a minimum, an approved first aid kit shall be available at the command post in the support zone.

4.2 TRANSPORTING THE INJURED

Improper transportation increases the possibility of further damage to a severely injured or ill person. Most communities are served by experienced rescue squads or emergency units staffed with trained emergency medical technicians. As circumstances warrant, help may also be requested





from local physicians, hospital emergency departments, or poison control centers. Generally, in an emergency, the best course of action is to request help from the community emergency or rescue squad. Its communication system is usually linked to local hospitals, poison control centers, etc. Its transport capability is much safer than, for example, that of a private vehicle hurriedly and improperly rushing a victim to a local hospital.

4.3 RESUSCITATION

All employees can and should become proficient in approved methods of resuscitation. Instruction will be given according to the needs of the employee.

4.4 ARTIFICIAL RESPIRATION

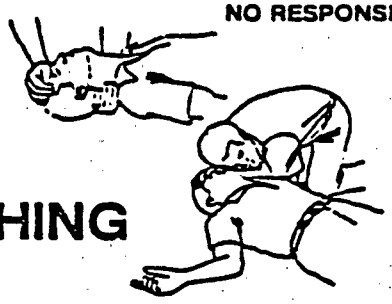
Several techniques for administering artificial respiration include the mouth-to-mouth (mouth-to-nose) and the chest-lift methods. The American Red Cross publishes the most complete instructions for artificial respiration; (the Red Cross First Aid Manual is available)
, which will also provide appropriate training for those individuals interested in becoming proficient in the techniques. (See Figure 2 for procedures for artificial respiration.)

WHEN BREATHING STOPS

IF A VICTIM APPEARS TO BE UNCONSCIOUS

TAP VICTIM ON THE SHOULDER AND SHOUT, "ARE YOU OKAY?"

IF THERE IS NO RESPONSE



TILT THE VICTIM'S HEAD, CHIN POINTING UP.
Place one hand under the victim's neck and gently lift. At the same time, push with the other hand on the victim's forehead. This will move the tongue away from the back of the throat to open the airway.

IMMEDIATELY LOOK, LISTEN, AND FEEL FOR AIR.
While maintaining the backward head tilt position, place your cheek and ear close to the victim's mouth and nose. Look for the chest to rise and fall while you listen and feel for the return of air. Check for about 5 seconds.

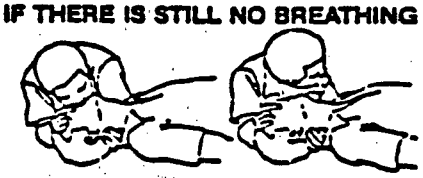
IF THE VICTIM IS NOT BREATHING

GIVE FOUR QUICK BREATHS.
Maintain the backward head tilt, pinch the victim's nose with the hand that is on the victim's forehead to prevent leakage of air, open your mouth wide, take a deep breath, seal your mouth around the victim's mouth, and blow into the victim's mouth with four quick but full breaths just as fast as you can. When blowing, use only enough time between breaths to lift your head slightly for better inhalation. For an infant, give gentle puffs and blow through the mouth *and* nose and do not tilt the head back as far as for an adult.

If you do not get an air exchange when you blow, it may help to reposition the head and try again.

AGAIN, LOOK, LISTEN, AND FEEL FOR AIR EXCHANGE.

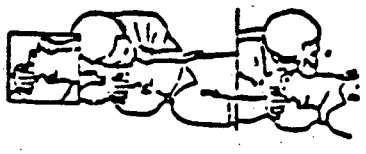
IF THERE IS STILL NO BREATHING



CHANGE RATE TO ONE BREATH EVERY 5 SECONDS FOR AN ADULT.

FOR AN INFANT, GIVE ONE GENTLE PUFF EVERY 3 SECONDS.

MOUTH-TO-NOSE METHOD



The mouth-to-nose method can be used with the sequence described above instead of the mouth-to-mouth method. Maintain the backward head-tilt position with the hand on the victim's forehead. Remove the hand from under the neck and close the victim's mouth. Blow into the victim's nose. Open the victim's mouth for the look, listen, and feel step.

FIGURE 2. RED CROSS PROCEDURES FOR ARTIFICIAL RESPIRATION

4.5 MECHANICAL RESPIRATORS

The inhalator, the respirator, and similar motorless devices are aids only and should not take the place of the approved, manually applied, prone (face down) pressure methods of artificial respiration. Only a trained person should attempt to use this type of equipment.

4.6 ASPHYXIATION

4.6.1 Symptoms

The usual symptoms of asphyxiation are yawning, headache, dizziness, nausea, ringing in the ears, and, later, a throbbing of the heart. The symptoms, however, may come on so suddenly that the victim is unaware of any trouble until his/her knees give way and, though conscious, the victim has lost all strength to either walk or crawl. The skin of an asphyxiated person may also change color to blue or cherry red (as may be seen during carbon monoxide poisoning).

4.6.2 Care

Ventilate the lungs with oxygen using the prone method of resuscitation and oxygen supplied with an inhalator. Treat the victim for shock. Never walk an axphyxiation victim; walking quickly uses up the remaining oxygen in the blood.

4.7 TRAUMATIC SHOCK

Any injured person is potentially in shock and should be regarded as such, whether symptoms are present or not.

4.7.1 Symptoms

The degree of shock (circulatory collapse) may be anything from mild to severe; the latter frequently results in death. In cases of mild shock lasting only a short time, the recuperative body processes alone may be successful, and the victim may recover without additional help. Where an injury of a more serious nature has been received, the shock may be delayed and much more severe; symptoms of shock may appear several hours after serious injury. For example, the pulse may become so weak that it is difficult to count; the blood pressure becomes much lower than normal. Nausea and vomiting often occur. The skin of the victim's face and extremities becomes cold and moist and turns pale. Breathing is shallow and rapid and later becomes irregular. Finally, the victim lapses into unconsciousness. By the time these symptoms appear, the person's condition has become serious and life threatening.

4.7.2 Care

Do not move the patient more than is necessary. Loosen tight clothing. Lower patient's head relative to the legs. Do not give alcohol or stimulants. Keep warm with blankets. Administer oxygen, if necessary.

4.8 BLEEDING

Bleeding after injury may be of three general types: (1) The severing of an artery produces spurting bright-red blood. If the bleeding is not controlled quickly, death can follow in minutes. (2) If a vein is cut, darker colored bleeding occurs in a rather steady flow. (3) If the skin is scraped, burned, or scratched, the smallest blood vessels are damaged. From these capillaries, blood oozes in rather small quantities.

Bleeding can be controlled by one or more of the following methods:

- Elevating the wounded arm or leg.
- Applying direct pressure over the wound with the fingers or a firm bandage.
- Applying pressure on the pressure points.
- Using a tourniquet, but only as a last resort.

4.9 FRACTURES

If a fracture is suspected, call for a physician immediately.

4.9.1 Symptoms

Sudden pain, swilling, and/or physical deformity are the usual symptoms of fractures.

4.9.2 Care

Avoid handling the injured part; do not attempt to set the fractured bone. Immobilize the injured area, and keep the victim in a prone position. Do not move the victim unless absolutely necessary. Treat him/her for shock.

4.10 EYE INJURIES

4.10.1 Foreign Bodies

If a foreign body is on the eyelid, remove it gently with a clean handkerchief. Never rub your eye if a foreign substance is on the pupil. Do not attempt to remove the object, but see a doctor.

4.10.2 Chemicals

Holding the lids apart, wash the eye for 5 minutes with running water at an eye fountain or with a gentle stream of water from a hose or tap. Do not use chemical antidotes. See a doctor immediately.

4.11 CHOKING

Foreign bodies or large pieces of food are the most common causes of choking. When someone has been eating and is suddenly unable to speak or cough, suspect airway obstruction. Clutching the throat is a distress signal.

Three ways to dislodge objects obstructing the air passage are back blows, manual thrust (abdominal thrust or chest thrust), and finger probes (Figure 3). Instructions in these techniques have been prepared by the American Red Cross and are available. Remember, back blows and manual thrusts may injure internal organs. Use judgment and care with these techniques.

4.12 FROSTBITE

4.12.1 Symptoms

The symptoms of frostbite are pain and a grayish-white color in the exposed part.

4.12.2 Care

Cover the frozen part with your hand or a dressing, or place it in warm water, so that thawing will occur gradually. Do not rub, expose it to a stove or fire, or put it in hot water; any of these treatments may cause serious permanent damage.

4.13 HEAT EXHAUSTION

4.13.1 Symptoms

A pale face, wet and clammy skin, weak pulse, and below-normal temperature are usual symptoms of heat exhaustion. The victim is usually conscious.

4.13.2 Care

Keep the victim in a prone position with the head low. Wrap him/her in blankets. Give the victim salt water (a teaspoon of salt to a pint of water) to drink in small amounts of frequent intervals and, as a stimulant, a cup of strong coffee or tea or one teaspoon of aromatic spirits of ammonia well diluted in water. If his/her condition does not improve quickly, call a doctor.

FIRST AID FOR CHOKING

UNIVERSAL CHOKING SIGN

If victim can cough, speak, breathe ➡ *Do not interfere*

If victim cannot
cough
speak
breathe ➡ *Have someone call for help. Telephone* _____ (Number)

TAKE ACTION: FOR CONSCIOUS VICTIM

4 QUICK BACK BLOWS

4 MANUAL THRUSTS

Repeat steps until effective or until victim becomes unconscious.

TAKE ACTION: FOR UNCONSCIOUS VICTIM

TRY TO VENTILATE

4 BACK BLOWS

4 MANUAL THRUSTS

FINGER PROBE

Repeat steps until effective.

Continue artificial ventilation or CPR, as indicated.

Everyone should learn how to perform the above first aid steps for choking and how to give mouth-to-mouth and cardiopulmonary resuscitation. Call your local Red Cross chapter for information on these and other first aid techniques.

FIGURE 1. RED CROSS PROCEDURES FOR CHOKING

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4.14 POISON IVY, OAK, AND SUMAC

The best cure for infection from poisonous plants is prevention. Recognize and avoid these plants. Do not burn poisonous plants; the smoke carries the sap, which causes infection on skin contact.

Since the poisonous serum is an acid, an alkali soap similar to yellow laundry soap is recommended for washing. Lather and wash all infected parts as soon after contact as possible; however, avoid scrubbing. Apply a liberal application of calamine lotion to all areas. If the infection is severe, see a doctor.

4.15 SUNSTROKE

4.15.1 Symptoms

Headache, hot and dry skin, red face, high fever, strong pulse, and unconsciousness accompany sunstroke.

4.15.2 Care

Keep the victim in a recumbent position with the head elevated. Apply cold cloths to his/her body to cool it. Always call a doctor.

4.16 COMMON MEDICAL EMERGENCIES

4.16.1 Animal Bites

Wash wounds freely with water, holding them under running tapwater for several minutes if possible. Apply a sterile gauze compress, and be sure to see a doctor immediately.

4.16.2 Punctures and Lacerations

Apply pressure with sterile gauze until bleeding stops; then apply soap and water. Allow the wound to dry and cover it with a sterile gauze dressing.

4.16.3 Bruises

Apply ice bags or cold cloths for about 25 minutes. If the skin is broken, treat the same as for minor lacerations.

4.16.4 Fainting

Keep victim's head slightly lowered. Loosen tight clothing. Pass a crushed aromatic spirits of ammonia inhaler under the victim's nose and sprinkle his/her face lightly with water. If the victim does not respond within a short time, summon a doctor at once and keep the victim warm until the doctor's arrival.

4.16.5 Splinters and Other Foreign Bodies

Apply antiseptic where the sliver is imbedded. If the sliver is small, remove it with tweezers. Care, following removal, is the same for minor cuts. For larger splinters with deep penetration, see a doctor.

4.16.6 Insect Bites

Remove the stinger if it is present. Apply a paste made of baking soda, cold cream, and water. If swelling is pronounced, use an ice bag or cold cloths over the paste.

Remove ticks with tissues and tweezers. Grasp the tick close to its head and remove with slow, firm tug. Do not twist. Alcohol will sometimes make ticks release their bite. Smother them with alcohol on a cotton ball.

4.16.7 Burns

Chemical Burns

Wash with copious amounts of water. Cover burned area loosely with a sterile or clean dry cloth or gauze dressing. Observe for symptoms of shock and treat accordingly. Consult a physician.

Thermal Burns

Remove all easily removable clothing, rings, and jewelry. Wrap burned area in sterile or clean sheets or dry dressings; do not apply creams or ointments. Observe and treat for shock; give oxygen. Give nothing by mouth. Consult a physician.

4.16.8 Scrapes or Abrasions

If the area is dirty, sponge it off gently with wet gauze, blot it dry, and apply an antiseptic to the scraped area. Allow it to dry and apply a dressing if necessary. If the scrape is deep and dirty, see a doctor.

4.16.9 Sprains (Joint Injuries)

Elevate the injured part and apply ice bags or cold cloths for 25 minutes immediately after the accident. If the swelling is pronounced, do not attempt to use the injured part until it is seen by a doctor.

4.17 POISONING

4.17.1 Inhaled Agents

Carry the victim to fresh air immediately; loosen tight clothing. Give artificial respiration by direct inflation if respiration is depressed.

Administer oxygen to assist breathing. Conserve body warmth by wrapping patient in blankets, if necessary.

4.17.2 Ingested (Swallowed) Poisons

Do not attempt any treatment if the patient is convulsing or unconscious.

If the patient is conscious, induce vomiting, but not if the swallowed poison was a strong caustic (strong acid or alkali) or contained petroleum products (gasoline, paint thinner, solvents). To induce vomiting, have the patient drink all the tapwater he/she can hold and put a finger or spoon into the patient's mouth and touch the back of the throat. Collect the vomited material in a suitable container for later analysis. Repeat by filling the stomach with water again and induce vomiting.

Conserve body warmth by wrapping the patient in blankets.

4.17.3 Systemic Poisons

Effective and useful specific antidotes for poisoning are limited in number, and their improper use may complicate the original injury by producing other forms of poisoning. In the first-aid situation, measures for the general and supportive treatment of poisoning are more likely to save lives than ill-considered and heroically applied antidotes.

In the rare instance in which there is an identifiable high risk of death from acute poisoning by a specific cause (work with organophosphate pesticides at lethal concentrations, for example), a physician's services must be obtained prior to exposure to develop specific first-aid instructions, to obtain necessary emergency drugs and antidotes, to train first-aid personnel, and to plan for transport and definitive care.

Emergency measures include:

- Maintain respiration and circulation.
- Administer oxygen as indicated.
- Observe and treat for shock.
- If the victim is unconscious, place him/her in prone or semi-prone position.
- Collect vomitus/urine, if passed. to aid in later identification of the poison.

4.17.4 Identify Chemical Agent

Knowledge of the offending agent(s) is of utmost help to emergency medical personnel who will have to care for victims. Every attempt should be made to obtain and transmit as much information as possible about the cause, nature, and circumstances of the injury. If the exact chemical cannot be identified, educated guesses as to class of substance, etc., may still be helpful. The following information will also be helpful:

- Physical state of the agent (solid, liquid, gas).
- Odor.
- Trade name.
- Use.
- Presence of any labels.
- Inflammability warning.

APPENDIX D

ENDICOTT WELLFIELD ANALYTICAL DATA, 1980-1986

APPENDIX D

TABLE 1

29 Priority Pollutants Analyzed
for in EPA Method 601

Chloromethane
Bromomethane
Vinyl Chloride
Dichlorodifluormethane
Chloroethane
Trichlorofluoromethane
Dichloromethane
1,1-Dichloroethene
1,1-Dichloroethane
Trans-1,2-Dichloroethene
Chloroform
1,2-Dichloroethane
1,1,1-Trichloroethane
Carbon Tetrachloride
Bromodichloromethane
1,2-Dichloropropane
Trans-1,3-Dichloropropene
Trichloroethylene
Dibromochloromethane
Cis-1,3-Dichloropropene
1,1,2-Trichloroethane
2-Chloroethylvinyl Ether
Bromoform
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Chlorobenzene
1,3-Dichlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene

Appendix D
Table 2: Summary of Positive Organic Chemical Sample Results 12/10/80 to 5/10/83

Date	Location	Lab.	Chloroform	Bromodi-Chloromethane	Dibromo-Chloromethane	Vinyl Chloride	1,1-Dichloro-ethane	cis/Trans-1,2 dichloro-ethylene	1,1,1-Trichloro-ethane	Trichloro-ethylene	
12/10/80	Well 5	DOH		2.0	2.0	NA	NA	NA	2.0		Wells 5 & 28 are at South St. well field
"	Ranney	"				NA	NA	NA			
1/7/81	Well 5	"				NA	NA	NA	2.0		
5/11/81	Ranney	EPA				8.4					
7/23/81	Wells 5&28	DOH	2.3	1.1					1.7		
2/23/82	Ranney	EPA	0.6	0.34		7.5	3.5	6.0	1.1	1.4	
"	Well 28	"				1.6	0.55	2.1	0.41		
"	Robbie Ave.	"	0.86	0.57		5.6	3.1	5.4	1.1	1.3	
9/28/82	Ranney	DOH	1.0				2.0	6.0			
"	Well 28	"						3.0			
11/9/82	Robbie Ave.	"	1.0			2.0	4.0	7.0	8.0	2.0	
"	Ranney	"	1.0			3.0	4.0	7.0	5.0	2.0	
"	Well 28	"					1.0	5.0			
12/13/82	Well 28	"				1.0		4.0	1.0		
"	Ranney	"	2.0			3.0	3.0	5.0	2.0	2.0	
"	Robbie Ave.	"	2.0	1.0		3.0	3.0	5.0	2.0	2.0	
1/18/83	Well 28	"					1.0	3.0			
"	Ranney	"	1.0	1.0		3.0	3.0	5.0	1.0	2.0	
"	Robbie Ave.	"	1.0			1.0	2.0	4.0		1.0	Robbie Ave. & Boswell Hill are pumping stations
"	Boswell Hill	"	1.0	1.0		1.0	2.0	4.0	1.0	1.0	
1/27/83	Ranney	"	1.0			2.0	2.0	5.0	1.0	5.0	
"	Lateral A-7	"	1.0				2.0	3.0	2.0	3.0	

Appendix D
Table 2: Summary of Positive Organic Chemical Sample Results

Date	Location	Lab.	Chloroform	Bromodi-Chloromethane	Dibromo-Chloromethane	Vinyl Chloride	1,1-Dichloro-ethane	cis/Trans-1,2 dichloro-ethylene	1,1,1-Trichloro-ethane	Trichloro-ethylene
"	Lateral B-2	DOH	1.0			1.0	2.0	3.0	2.0	3.0
"	Lateral C-1	"				6.0	3.0	10.0		1.0
2/3/83	Lateral D-1	Friend					1.0	1.0		
"	Lateral D-2	"				17.0	5.0	11.0		
"	Lateral D-3	"				17.0	12.0	22.0		
"	Lateral D-4	"				2.0	7.0	9.0		
"	Lateral D-7	"					1.0	2.0		
2/3/83	Lateral C-2	"					2.0	3.0	1.0	
"	Lateral C-3	"					2.0	2.0		
"	Lateral C-4	"					4.0	3.0	1.0	
"	Lateral C-5	"					2.0		1.0	2.0
"	Ranney Tap	"				2.0	2.0	2.0		
2/17/83	"	"				3.0				
"	Lateral D-2	"				10.0	13.0	5.0	5.0	
"	Lateral D-3	"				20.0	8.0	19.0		
"	Lateral D-4	"				4.0	5.0	13.0		
"	Lateral D-8	"				1.0	1.0	1.0		
"	Lateral C-2	"				3.0	3.0	6.0		
"	Lateral C-3	"					3.0	4.0		
3/3/83	Ranney	"				2.0	2.0	5.0		
5/10/83	"	"				2.0	2.0	5.0		
"	Kelley	"				11.0	5.0	18.0		

Appendix D
Table 2: Summary of Positive Organic Chemical Sample Results

Date	Location	Vinyl Chloride	Chloro-methane	Chloro-ethane	1,1-Dichloro-ethane	Trans 1,2-Dichloro-ethene	Chloroform	Bromo-Dichloro-Methane	Trichloro-ethylene
5/10/83	Ranney	2.0			2.0	4.0			
"	Golf Course Well								
"	Kelley	4.0		4.0	3.0	12.0			
6/9/83	E Relief Well								
"	W Relief Well								
"	Hancor Well								
6/22/83	B-1	1.0			1.0	9.0	2.0		5.0
"	B-2			1.0		15.0			100.0
"	B-3	110.0		38.0	9.0	84.0			
"	Kelley				3.0	9.0			
6/23/83	Ranney	3.0			3.0	7.0	2.0	2.0	1.0
7/20/83	B-1								
"	B-2				12.0	11.0			4.0
"	B-3	99.0		57.0	10.0	50.0			
"	B-4								
"	B-5								
8/18/83	B-4								
"	B-5								
"	B-6								
"	B-8								
"	B-9			3.0					
"	B-10								

(All analyses performed by NYSDOH laboratory, Albany, NY)

Appendix D
Table 2: Summary of Positive Organic Chemical Sample Results

Date	Location	Vinyl Chloride	Chloro-methane	Chloro-ethane	1,1-Dichloro-ethane	Trans 1,2 Dichloro-ethene	Chloroform	Bromo-Dichloro-Methane	Trichloro-ethylene
8/19/83	Tier I Stop								
9/23/83	B-6								
"	B-8								
"	B-9			2.0					
"	B-10								
10/27/83	B-11		10.0	5.0					
"	B-12	66.0	29.0	280.0	54.0	24.0			4.0
"	B-13	17.0	17.0	50.0	47.0	64.0			1.0

(All analyses performed by NYSDOH laboratory, Albany, N.Y.)

All results in parts per billion.

A blank indicates "not detected".

NA means "not analyzed for".

ENDICOTT WELLFIELD PROJECT

APPENDIX D
TABLE 3: GROUNDWATER ANALYSIS (1984)

All results in ug/L (ppb)

DATE	WELL	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	METHYLENE CHLORIDE	TRICHLORO-ETHYLENE	TOX
09-May-84	B-15	180	66					246
09-May-84	B-16	59	44	34	5			172
09-May-84	B-17	110	46	44	5			205
26-Jun-84	PURGE	150	55	150	16			371
27-Jun-84	PURGE	110	43	83	9	1		246
27-Jun-84	B-3	76	23	51	5			155
27-Jun-84	B-12	68	390	39	28	2	2	529
27-Jun-84	B-16	56	18	42	4			120

D-6

ANALYSIS: EPA Method 601 - Volatile Halogenated Organics
Detection Limit: 1 ppb
All positive finds reported
Performed by New York State Department of Health,
Center for Laboratories and Research

DATA FROM: "Addendum to: A Hydrogeologic Investigation of Chlorinated Hydrocarbon Contamination at the Ranney Collector Well, Village of Endicott, New York" Alan Grant, Division of Water, NYSDEC, August 1984.

APPENDIX D

Table 4-A

ENDICOTT WELLFIELD PROJECT

Data Obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

Purge Well Pumping @ 200 GPM or less
All results in ug/L (ppb)

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1-TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	TOX	NOTES
14-Sep-84	RANNEY			2					2	
	PURGE	73	92	110		13			288	
	B-3	81	63	53		4			201	
18-Sep-84	PURGE	190	200	130		12			532	
21-Sep-84	RANNEY	2	4	3		1			10	
	PURGE	170	370	75		12			627	
	B-3	27	80	57		4			168	
	B-12	14	250	14		17			295	
	B-13	5	56	94		25			180	
25-Sep-84	PURGE	86	210	63		7			366	
28-Sep-84	RANNEY								0	
	B-3	140	91	130		8			369	
	PURGE	102	110	140		16			368	
02-Oct-84	PURGE	150	150	110		11			421	
05-Oct-84	RANNEY			2					2	Holding time exceeded
	B-3	97	180	91		9			377	
	PURGE	110	160	110		13			393	
09-Oct-84	PURGE	130	160	120		16			426	
16-Oct-84	RANNEY								0	Holding time exceeded
	PURGE	200	220	29					469	
	B-3	16	89	39					144	
	B-12	27	300	22		29			378	
	B-13	4	64	160		49			277	
23-Oct-84	RANNEY								0	Holding time exceeded
	B-3	11	43	6					60	
	PURGE	10	90	8		14			122	
30-Oct-84	RANNEY								0	Holding time exceeded
	B-3	51	340	70		14			475	
	PURGE	120	280	74		19			493	
07-Nov-84	RANNEY	2	1	2					5	Holding time exceeded
	B-3	49	180	90		21			340	
	PURGE	110	140	64		18			332	
13-Nov-84	RANNEY	2		4		1			7	Holding time exceeded
	B-3	79	540	140		22			781	
	B-13	13	91	100		48			252	
	B-12	29	700	29		35	3		796	
	PURGE	170	270	150		16			606	
20-Nov-84	RANNEY	2		3					5	
	B-3	44	370	70		16			500	
	PURGE	110	230	99		12			451	

APPENDIX D

Table 4-A

ENDICOTT WELLFIELD PROJECT

Data Obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

Purge Well Pumping @ 200 GPM or less
All results in ug/L (ppb)

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1-TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	TOX	NOTES
13-Jul-84	RANNEY	3		6	2				11	
27-Jul-84	RANNEY	2		7		2	2		13	
	PURSE	100	180	125		9			414	
	B-12	12	560	21		21			614	
	B-3	39	69	114		3			225	
31-Jul-84	PURGE	24	68	93		4			189	
03-Aug-84	RANNEY	8		3					11	
	PURGE	210	640	110		11			971	
07-Aug-84	PURGE	100	1000	68		11			1179	
	B-3	91	340	52		4			487	
10-Aug-84	RANNEY	2		2		1			5	
	B-3		170	64				19	253	
	PURGE	12	190	68		9			279	
14-Aug-84	PURGE	20			14			13	47	
17-Aug-84	RANNEY	2				2			4	
	PURGE	61	55	75		11			202	
	B-3		83	43				12	138	
20-Aug-84	B-12	91	1700	37		16	28	7	1879	
21-Aug-84	PURGE	193	122	120		22			457	
24-Aug-84	B-13								0	
	B-12	3	430	28		36			497	
	B-3	8	140	64		9			221	
	RANNEY			2					2	
	PURGE	8	140	64		9			221	
28-Aug-84	PURGE	4	150	95		13			262	Holding time exceeded
31-Aug-84	PURGE	11	80	62		13			166	Holding time exceeded
	B-3		57	44		4			105	
	RANNEY	2		1		2			5	
	GANNEY								0	Analysis by ERCO
	B-13								0	Analysis by ERCO
	B-3	98	54	64		8			224	Analysis by ERCO
	PURGE	130	95	99		16			340	Analysis by ERCO
	B-12	43	310	30		34			417	Analysis by ERCO
04-Sep-84	PURGE	10	240	70		9			329	Holding time exceeded
	RANNEY			3					3	Holding time exceeded
	B-3		47	80		4			131	
	PURGE		17	110		16			143	
	B-13	14	35	170		48			267	
	B-12	49	9	60		76			194	
11-Sep-84	PURGE	8	210	80		4			302	

APPENDIX D

Table 4-A

ENDICOTT WELLFIELD PROJECT

Data Obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

Purge Well Pumping @ 200 GPM or less
All results in ug/L (ppb)

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1-TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	TOX	NOTES
27-Nov-84	RANNEY			2					2	
	B-3	29	150	60		19			258	
	PURGE	97	720	92		13			922	
04-Dec-84	RANNEY			2					2	
	B-3	44	280	36		21			381	
	B-13	6	43	99		30			178	
	B-12	16	420	24		23			483	
	PURGE	99	110	85		13			307	
11-Dec-84	RANNEY	1		1					2	
	B-3	50	310	45		20		4	429	
	B-13	9	110	81		33			233	
	PURGE	160	130	86		15			391	
	B-12	26	68	15		29			138	
18-Dec-84	RANNEY	2		2					4	
	PURGE	81	110	93		14			298	
02-Jan-85	RANNEY			3					3	
	PURGE	72	310	87		12			481	
15-Jan-85	RANNEY	1		1					2	
	B-3	1	160	18		3		3	185	
	B-13	9	22	39		23			97	CHLOROFORM: 4 ug/L
	B-12	19	240	17		7		3	306	CHLOROFORM: 20 ug/L
	PURGE	110	93	65		14			282	
29-Jan-85	RANNEY	1		2					3	
	PURGE	77	270	110		18			475	

APPENDIX D
Table 4-8: Purge Well Pumping @ 600 GPM

All results in ug/L (ppb)
Data obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1-TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	1,1-DI-CHLORO-ETHENE	1,2-DI-CHLORO-ETHANE	TOX	NOTES
12-Feb-85	RANNEY			2							2	
	B-13	4	28	47		29					108	
	B-3	31	120	100		19					270	
	B-12	23	310	52		22					407	
	PURGE	38	79	78		15					210	
26-Feb-85	RANNEY										0	
	PURGE	47	130	64		14			7		262	
12-Mar-85	B-3	18	100	23		20		1			162	
	B-13	4	6	38		21					69	
	B-12	22	390	31		25		3		10	481	
	PURGE	51	120	65		14					250	
	RANNEY	3					3				6	
26-Mar-85	RANNEY	1		2							3	
	PURGE	57	170	65		12					304	
09-Apr-85	RANNEY			2							2	
	PURGE	40	270	64		8		1			385	
	B-3	2	320	4		13		4		2	345	
	B-12	19	250	24		12		5		6	316	
	B-13	6	23	10		11		1		2	53	
23-Apr-85	PURGE	19	42	15		2		5			86	CHLOROFORM 3 ug/L
	RANNEY			3							3	
07-May-85	RANNEY										0	
	B-3		98	19		6					123	
	B-12	18	300	13		7				2	340	
	PURGE	44	77	15		14				3	153	
	B-13	2	6	8		7					23	
21-May-85	RANNEY						2				2	
	PURGE	25	8	18							51	
04-Jun-85	RANNEY			2							2	
	PURGE	15	16	1		10					42	
	B-3	16	10			89				4	119	
	B-12	26					11				37	
	B-13	4	7								11	

APPENDIX B
Table 4-8: Purge Well Pumping @ 600 GPM

All results in ug/L (ppb)
Data obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1 TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	1,1-DI-CHLORO-ETHENE	1,2-DI-CHLORO-ETHANE	TOX	NOTES
10-Jun-85	BARNEY										0	
	PURGE	15	16	1		10					42	
02-Jul-85	BARNEY						24				26	TETRACHLOROETHENE 2 ug/L
	PURGE	130	43	6		10	11				200	
	B-3	37	130	5	41	13		1			247	
	B-12	520	610			37		6			1173	
	B-13	240	55					20			355	
16-Jul-85	BARNEY		1								1	
	PURGE		8	68		19		67			162	
30-Jul-85	BARNEY		1								1	
	PURGE	2	19				71	12			104	
	B-12	10	6	20		1	3	55			85	
	B-13	5	2	1		1	7	7			23	
	B-3		4				1	3			8	
13-Aug-85	BARNEY		1				1				2	
	PURGE	1					61	14			76	
03-Sep-85	BARNEY	1	2								3	HOLDING TIME EXCEEDED
	PURGE	2	30			4					36	
	B-3	2	4			2					8	
	B-13	2	4	12	290	3					311	
	B-12	9	3	24		14					50	
30-Sep-85	BARNEY	1				1					2	
	PURGE	4	25			2					31	
01-Oct-85	BARNEY			6		13					19	
	PURGE		450	7		42			1		500	
	B-3	21	50	310		680			20		1081	
	B-12	17	1050	300	1	840			76		2284	
	B-13	21	160	70		1150			33		1434	
15-Oct-85	BARNEY		2	3	1				3		90	CHLOROFORM: 81 ug/L
	PURGE	530	420			4		2	80		1054	CHLOROFORM: 8 ug/L
29-Oct-85	B-3	7	33			49			1		101	CHLOROFORM: 11 ug/L
	B-12		1360			75		2	7		1446	CHLOROFORM: 2 ug/L
	B-13		110			130		2	1		243	
	BARNEY					2	2				7	CHLOROFORM: 3 ug/L
	PURGE		270	2		25		1			302	CHLOROFORM: 4 ug/L

APPENDIX B
Table 4-B: Purge Well Pumping @ 600 GPM

All results in ug/L (ppb)
Data Obtained from NYSDEC
Analysis by FRIENDS Laboratory, except as noted

DATE	LOCATION	VINYL CHLORIDE	CHLORO-ETHANE	TRANS 1,2 DICHLORO-ETHYLENE	TRI-CHLORO-ETHYLENE	1,1-DI-CHLORO-ETHANE	1,1,1-TRI-CHLORO-ETHANE	METHYLENE CHLORIDE	1,1-DI-CHLORO-ETHENE	1,2-DI-CHLORO-ETHANE	TOX	NOTES
06-Nov-85	B-13	8	9	69		22				1	109	11/6 ANALYSES BY NYSDOH
	B-3	15	6	31		8		1			61	
	RANNEY			3	2	1					7	CHLOROFORM: 1 ug/L
	B-12	79	260	45	2	21		3			401	
12-Nov-85	PURGE								140		143	TRIHALOMETHANES 3 ug/L
	RANNEY								19		20	TRIHALOMETHANES 1 ug/L
26-Nov-85	B-12	43	730	9		13					795	
	B-13							14			24	CHLOROFORM: 10 ug/L
	B-3			26							26	
	PURGE	79	35	11		2		1			128	
	RANNEY				1						6	CHLOROFORM 5 ug/L
10-Dec-85	RANNEY				1	1					2	
23-Dec-85	RANNEY					3					3	
	PURGE	7	39			56			10		112	
08-Jan-86	RANNEY			2	1	1					4	
	PURGE	45	49	56		12		2	1		166	TRICHLOROFLUOROMETHANE 1 ug/L
	B-3	3	1	16		8					28	
	B-12		130	1		15		4	1		151	
	B-13	2	6	2		19			1	2	32	
21-Jan-86	PURGE	7	37	61		9					109	
	RANNEY			2	1						3	

APPENDIX D

TABLE 5

Inorganic data from July 20, 1983

(all data reported in milligrams/liter except where noted)

Parameter	Well Number B-1	B-2	B-3	B-4	B-5
Zinc	0.48	0.58	2.0	0.88	0.84
Lead,Total	< 0.1	0.3	< 0.1	0.2	0.3
Beryllium, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Copper, Total	0.10	0.40	0.07	0.15	0.35
Nickel, Total	0.11	0.34	0.06	0.06	0.20
Silver, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury*	0.5	1.1	<0.4	<0.4	0.5
Cadmium, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Antimony, Total	< 1.	< 1.	<1.	<1.	<1.
Chromium, Total	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium, Total	<1.	<1.	<1.	<1.	<1.
B.O.D. 5 Day	2.7	3.1	2.6	2.6	1.1
pH	7.8	7.5	7.6	7.8	7.5
Manganese, Total	1.1	0.54	1.1	0.13	0.20
Iron, Total	32.	34.	12.	4.6	19.
Nitrogen, Ammonia	0.23	0.90	0.24	0.040	0.14
Nitrogen, Nitrate & Nitrite	0.30	0.41	<0.05	<0.05	0.91
Sodium, Total	22.	19.	44.	6.1	25.
Chloride	32.	27.	85.	6.3	48.
Hardness, Total as $CaCO_3$	214.	320.	460.	149.	300.
Alkalinity to pH 4.5	182.	280.	377.	133.	236.
Potassium, Total	3.3	3.5	2.1	1.3	1.8
Sulfate as SO_4	24.	20.	8.5	19.	28.
Solids, Total Dissolved, 180 C	250.	343.	565.	183.	396.
Nitrogen, Kjeldahl, Including Ammonia	15.	15.	0.56	0.090	0.17
Calcium, Total	38.	58.	67.	29.	49.
Magnesium, Total	16.	25.	26.	7.6	16.
Conductivity**	429.	611.	931.	305.	651.
Selenium, Total*	< 10.	<10.	<10.	<10.	<10.
Sodium			41.		
C.O.D.	22.	45.	20.	6.8	7.6
Barium, Total	< 0.5	< 0.5	<0.5	<0.5	<0.5
Arsenic, Total*	12.	< 10.	<10.	<10.	<10.

* results in micrograms/liter

** micromhos/cm^2

APPENDIX D

TABLE 5

Inorganic data from July 20, 1983

(all data reported in milligrams/liter except where noted)

Parameter	Well Number B-1	B-2	B-3	B-4	B-5
Zinc	0.48	0.58	2.0	0.88	0.84
Lead,Total	< 0.1	0.3	< 0.1	0.2	0.3
Beryllium, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Copper, Total	0.10	0.40	0.07	0.15	0.35
Nickel, Total	0.11	0.34	0.06	0.06	0.20
Silver, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury*	0.5	1.1	<0.4	<0.4	0.5
Cadmium, Total	<0.02	<0.02	<0.02	<0.02	<0.02
Antimony, Total	< 1.	< 1.	<1.	<1.	<1.
Chromium, Total	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium, Total	<1.	<1.	<1.	<1.	<1.
B.O.D. 5 Day	2.7	3.1	2.6	2.6	1.1
pH	7.8	7.5	7.6	7.8	7.5
Manganese, Total	1.1	0.54	1.1	0.13	0.20
Iron, Total	32.	34.	12.	4.6	19.
Nitrogen, Ammonia	0.23	0.90	0.24	0.040	0.14
Nitrogen, Nitrate & Nitrite	0.30	0.41	<0.05	<0.05	0.91
Sodium, Total	22.	19.	44.	6.1	25.
Chloride	32.	27.	85.	6.3	48.
Hardness, Total as $CaCO_3$	214.	320.	460.	149.	300.
Alkalinity to pH 4.5	182.	280.	377.	133.	236.
Potassium, Total	3.3	3.5	2.1	1.3	1.8
Sulfate as SO_4	24.	20.	8.5	19.	28.
Solids, Total Dissolved, 180 C	250.	343.	565.	183.	396.
Nitrogen, Kjeldahl, Including Ammonia	15.	15.	0.56	0.090	0.17
Calcium, Total	38.	58.	67.	29.	49.
Magnesium, Total	16.	25.	26.	7.6	16.
Conductivity**	429.	611.	931.	305.	651.
Selenium, Total*	< 10.	<10.	<10.	<10.	<10.
Sodium			41.		
C.O.D.	22.	45.	20.	6.8	7.6
Barium, Total	< 0.5	< 0.5	<0.5	<0.5	<0.5
Arsenic, Total*	12.	< 10.	<10.	<10.	<10.

* results in micrograms/liter

** micromhos/cm^2